VOLUME 1

18 U.S.C. 922(o): Transfer or possession of machinegun
26 U.S.C. 5845(b): Definition of machinegun
18 U.S.C. 921(a)(23): Definition of machinegun

The definition of machinegun in the National Firearms Act and the Gun Control Act includes a part or parts that are designed and intended for use in converting a weapon into a machinegun. This language includes a device that, when activated by a single pull of the trigger, initiates an automatic firing cycle that continues until the finger is released or the ammunition supply is exhausted.

ATF Rul. 2006-2

The Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) has been asked by several members of the firearms industry to classify devices that are exclusively designed to increase the rate of fire of a semiautomatic firearm. These devices, when attached to a firearm, result in the firearm discharging more than one shot with a single function of the trigger. ATF has been asked whether these devices fall within the definition of machinegun under the National Firearms Act (NFA) and Gun Control Act of 1968 (GCA). As explained herein, these devices, once activated by a single pull of the trigger, initiate an automatic firing cycle which continues until either the finger is released or the ammunition supply is exhausted. Accordingly, these devices are properly classified as a part "*designed and intended solely and exclusively, or combination of parts designed and intended, for use in converting a weapon into a machinegun"* and therefore machineguns under the NFA and GCA.

The National Firearms Act (NFA), 26 U.S.C. Chapter 53, defines the term "firearm" to include a machinegun. Section 5845(b) of the NFA defines "machinegun" as *"any weapon which shoots, is designed to shoot, or can be readily restored to shoot, automatically more than one shot, without manual reloading, by a single function of the trigger. The term shall also include the frame or receiver of any such weapon, any part designed and intended solely and exclusively, or combination of parts designed and intended, for use in converting a weapon into a machinegun, and any combination of parts from which a machinegun can be assembled if such parts are in the possession or under the control of a person."* The Gun Control Act of 1968 (GCA), 18 U.S.C. Chapter 44, defines machinegun identically to the NFA. 18 U.S.C. 921(a)(23). Pursuant to 18 U.S.C. 922(o), machineguns manufactured on or after May 19, 1986, may only be

transferred to or possessed by Federal, State, and local government agencies for official use.

ATF has examined several firearms accessory devices that are designed and intended to accelerate the rate of fire for semiautomatic firearms. One such device consists of the following components: two metal blocks; the first block replaces the original manufacturer's V-Block of a Ruger 10/22 rifle and has attached two rods approximately ¼ inch in diameter and approximately 6 inches in length; the second block, approximately 3 inches long, 1 ⅜ inches wide, and ¾ inch high, has been machined to allow the two guide rods of the first block to pass through. The second block supports the guide rods and attaches to the stock. Using ¼ inch rods, metal washers, rubber and metal bushings, two collars with set screws, one coiled spring, C-clamps, and a split ring, the two blocks are assembled together with the composite stock. As attached to the firearm, the device permits the entire firearm (receiver and all its firing components) to recoil a short distance within the stock when fired. A shooter pulls the trigger which causes the firearm to discharge. As the firearm moves rearward in the composite stock, the shooter's trigger finger contacts the stock. The trigger mechanically resets, and the device, which has a coiled spring located forward of the firearm receiver, is compressed**.** Energy from this spring subsequently drives the firearm forward into its normal firing position and, in turn, causes the trigger to contact the shooter's trigger finger. Provided the shooter maintains finger pressure against the stock, the weapon will fire repeatedly until the ammunition is exhausted or the finger is removed. The assembled device is advertised to fire approximately 650 rounds per minute. Live-fire testing of this device demonstrated that a single pull of the trigger initiates an automatic firing cycle which continues until the finger is released or the ammunition supply is exhausted.

As noted above, a part or parts designed and intended to convert a weapon into a machinegun, *i.e.*, a weapon that will shoot automatically more than one shot, without manual reloading, by a single function of the trigger, is a machinegun under the NFA and GCA. ATF has determined that the device constitutes a machinegun under the NFA and GCA. This determination is consistent with the legislative history of the National Firearms Act in which the drafters equated "single function of the trigger" with "single pull of the trigger." *See, e.g., National Firearms Act: Hearings Before the Comm. on Ways and Means, House of Representatives, Second Session on H.R. 9066*, 73rd Cong., at 40 (1934). Accordingly, conversion parts that, when installed in a semiautomatic rifle, result in a weapon that shoots more than one shot, without manual reloading, by a single pull of the trigger, are a machinegun as defined in the National Firearms Act and the Gun Control Act.

Held, a device (consisting of a block replacing the original manufacturer's V-Block of a Ruger 10/22 rifle with two attached rods approximately ¼ inch in diameter and approximately 6 inches in length; a second block, approximately 3 inches long, 1 ⅜ inches wide, and ¾ inch high, machined to allow the two guide rods of the first block to pass through; the second block supporting the guide rods and attached to the stock; using ¼ inch rods; metal washers; rubber and metal bushings; two collars with set screws; one coiled spring; C-clamps; a split ring; the two blocks assembled together with the

composite stock) that is designed to attach to a firearm and, when activated by a single pull of the trigger, initiates an automatic firing cycle that continues until either the finger is released or the ammunition supply is exhausted, is a machinegun under the National Firearms Act, 26 U.S.C. 5845(b), and the Gun Control Act, 18 U.S.C. 921(a)(23).

Held further, manufacture and distribution of any device described in this ruling must comply with all provisions of the NFA and the GCA, including 18 U.S.C. 922(o).

To the extent that previous ATF rulings are inconsistent with this determination, they are hereby overruled.

Date approved: December 13, 2006

Michael J. Sullivan
Director

U.S. Department of Justice

Bureau of Alcohol, Tobacco,
Firearms and Explosives

Martinsburg, WV 25405

www.atf.gov

903050:MRC
3311/301071

October 31, 2013

Mr. Michael Stakes
President
Tactical Fire Control, Inc
[redacted]

Dear Mr. Stakes,

This is in reference to your correspondence (including copy of a patent application), with accompanying AR-type fire-control components, received by the Firearms Technology Branch (FTB), Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). In your cover letter, you asked FTB to examine this "3MR™" trigger assembly (see enclosed photo) and determine its classification.

For your reference in this matter, the National Firearms Act, 26 U.S.C. Section 5845(b), defines "**machinegun**" as—

> *...any weapon which shoots, is designed to shoot, or can be readily restored to shoot, automatically more than one shot, without manual reloading, by a single function of the trigger. The term shall also include the frame or receiver of any such weapon,* ***any part designed and intended solely and exclusively, or combination of parts designed and intended, for use in converting a weapon into a machinegun,*** *and any combination of parts from which a machinegun can be assembled if such parts are in the possession or under the control of a person.*

As indicated, your prototype trigger has three modes: safe mode, a match grade semi-automatic mode, and another match grade semiautomatic mode with a positive reset characteristic. In support of this product, you point out that it will provide tactical and competition shooters with a "safer, faster, and more reliable trigger group." It is also intended to provide positive resets between each shot.

The FTB examination confirmed that the trigger unit consists of a housing, hammer, trigger, disconnector, selector, springs, and reset lever that are designed to be used in an AR-15 type platform. Our examination disclosed that when the selector is placed in the vertical position (apex at 12 o'clock), the trigger, disconnector, and hammer function as any AR-semiautomatic type trigger is designed to do. Further examination also showed that when the selector was placed in the horizontal position (apex at 3 o'clock), the reset lever pivots forward, and the hammer engages/contacts the lever during the cycling of the rifle. In this position, the hammer contacts the reset lever during cocking, which applies force to the trigger, forces the shooter's finger forward, and allows the trigger to reset rapidly.

In the course of our evaluation, FTB personnel installed the submitted 3MR™ trigger into an AR-15 type rifle housed in the ATF National Firearms Collection for test firing. During this phase, a function test was performed before live-fire was conducted. The 3MR™ functioned only semi automatically during both the field test and live-firing.

In conclusion, FTB has determined that the 3MR™ trigger assembly is not a part or combination of parts that will convert a semiautomatic firearm into a machinegun. Your sample will be returned via the FedEx account number provided in your cover letter.

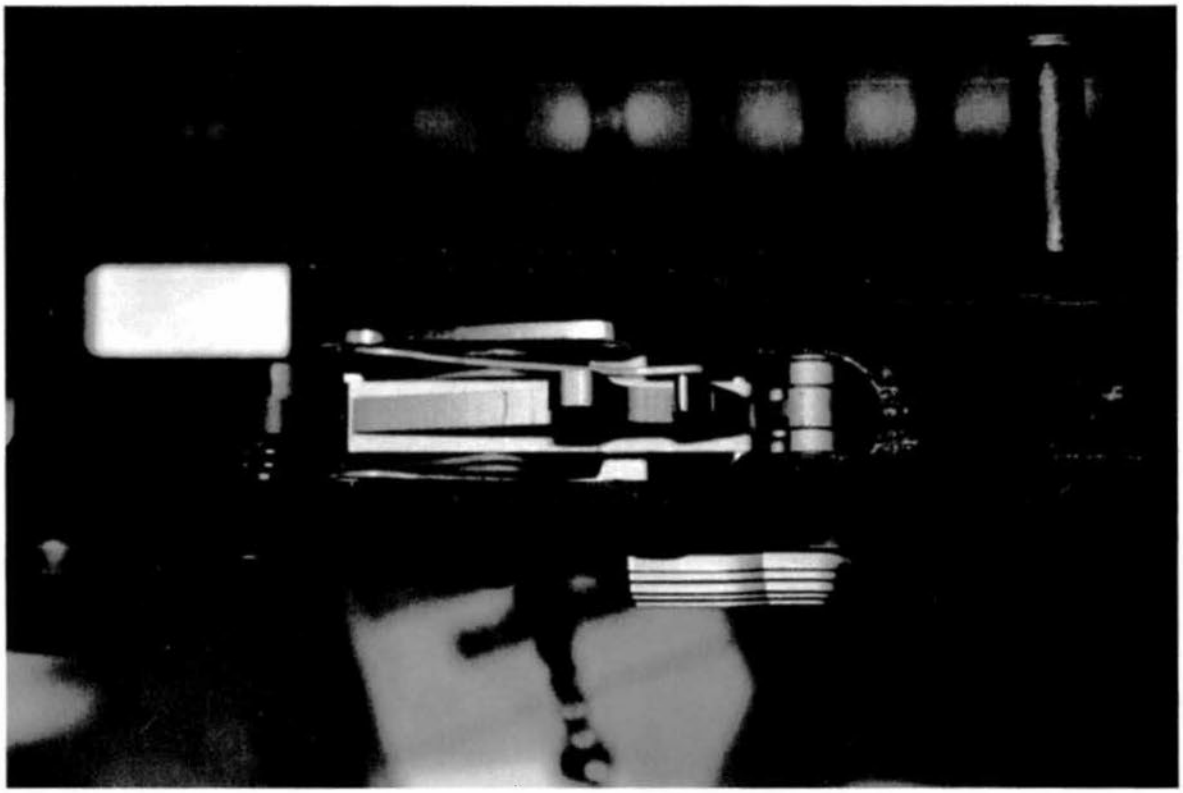
We thank you for your inquiry and trust the foregoing has been responsive to your evaluation request.

Sincerely yours,

Earl Griffith
Chief, Firearms Technology Branch

Enclosure

Tactical Fire Control 3MR™ Trigger



TACTICON

Tactical Fire Control, Inc.

EVAL. 301-071-MRC

June 24, 2013

RECEIVED
JUN 27 2013
BY: F.T.B.

Chief Firearms Tech Branch
244 Needy Road
Martinsburg, WV 25405

Dear Tech Branch:

Enclosed you will find the completed patent application, a prototype for testing and a flash drive. The flash drive has a digital version of the patent application, patent drawings and a file containing a series of photos that capture the operation of the trigger step by step in the reset mode. Also included is a KNS anti-walk pin set for installing the trigger. The reason for submitting the 3MR™ trigger for classification is the fact that it contains three modes: safe mode, a match grade semi-automatic mode and another match grade semi-automatic mode with a positive reset characteristic. The design was intended not to be considered a machinegun as defined by the NFA handbook section 2.1.6

> *Firearms within the definition of machinegun include weapons that shoot, are designed to shoot, or can be readily restored to shoot, automatically more than one shot without manual reloading by a single function of the trigger.*

This trigger will provide tactical and competition shooters with a safer, faster and more reliable trigger group. The main advantage of the reset characteristic is to provide a positive reset between rounds avoiding what tactical shooters refer to as "trigger lock" during a high stress situation. This also reduces the split times between rounds without having to make the trigger pull rate super light which leads to an unsafe feeling trigger. We would like to thank you in advance for your time.

Sincerely,

Michael A. Stakes

President – Tactical Fire Control, Inc.

Enclosure: Patent Application, Patent Drawings, Flash Drive, Prototype and KNS Anti-Walk Pins. We would like this to be returned to the address below after classification using our FedEx account number: 2915-2701-9

[redacted]

A TRIGGER MECHANISM

FIELD OF THE INVENTION

The present invention relates to trigger mechanisms.

BACKGROUND OF THE INVENTION

There are numerous trigger mechanisms capable of being locked in safe, semi-automatic, burst, and fully automatic operation. Different variations of rifles will allow some or all of the various modes of operation. Selector mechanisms have been developed for use with the trigger mechanisms to select between some or all of the various modes.

In firearms limited to safe and semi-automatic modes of operation, one of the drawbacks to the trigger mechanism occurs when the hammer is returned to the cocked position by the bolt carrier. After firing a round, the bolt carrier moves rearwardly, contacting the hammer and pivoting the hammer backwards into the cocked position. This action results in the sear hook at the striking end of the hammer directly striking the hammer-receiving surface of the disconnector and transferring energy to an operator's finger upon the trigger in the form of a sharp snap or forward movement of the trigger. After repeated firings of the weapon, this trigger snap can begin to cause bruising or other injury to the finger, making continued firing uncomfortable. Another drawback to the trigger mechanism occurs after firing when the trigger nose resets into the trigger notch of the hammer to prevent forward motion of the hammer preparatory to firing by another trigger pull, where there is a substantial pause as the hammer travels rearwardly from the

cocked position, to the past-cocked position, and then forwardly to the cocked position preparatory to firing by another trigger pull. This pause inherently limits the speed of repeated trigger pulls in the semi-automatic mode of operation, which, for many competitive shooters, is not satisfactory. Accordingly, there is a need in the art for a trigger mechanism that limits trigger snap and improves the trigger-to-hammer reset between trigger pulls in the semi-automatic mode of operation.

SUMMARY OF THE INVENTION

According to the principle of the invention, a trigger mechanism includes a trigger disconnector assembly having a trigger nose, and a disconnector having a disconnector hook. A reset lever is mounted for pivotal movement between open and closed positions. The trigger disconnector assembly is mounted for pivotal movement between charged and discharged orientations, the charged orientation being a set position of the trigger nose and a disengaged position of the disconnector hook, and the discharged orientation being a released position of the trigger nose and an engaged position of the disconnector hook. A hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer. The trigger disconnector assembly is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the trigger disconnector assembly to pivot the trigger disconnector assembly from the discharged orientation to the charged orientation when the reset lever moves from the open position to the closed position, to position the trigger nose in the set position in preparation to be received by the trigger notch in the cocked position of the hammer and to position the disconnector in the disengaged position of the disconnector hook relative to the hammer disconnect notch. A spring keeps tension on the reset lever urging the reset lever toward the closed position. The reset lever isolates the hammer from the trigger disconnector assembly, preventing the hammer from striking the

trigger disconnector assembly in the past cocked position of the hammer.

According to the principle of the invention, a trigger mechanism includes a trigger disconnector assembly having a trigger nose, and a disconnector having a disconnector hook and a cam surface. A reset lever is mounted for pivotal movement between open and closed positions. The trigger disconnector assembly is mounted for pivotal movement between charged and discharged orientations, the charged orientation being a set position of the trigger nose and a disengaged position of the disconnector hook, and the discharged orientation being a released position of the trigger nose and an engaged position of the disconnector hook. A hammer includes a striking end including a striking surface and an opposed hammer tail, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a forward position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the set position of the trigger nose and the cocked position of the hammer. The cam surface of the trigger disconnector assembly is in mechanical communication with the reset lever, the hammer tail of the striking end of the hammer strikes the reset lever in the past-cocked position the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the cam surface to pivot the trigger disconnector assembly from the discharged orientation to the charged orientation when the reset lever moves from the open position to the closed position, to position the trigger nose in the set position in preparation to be received by the trigger notch in the cocked position of the hammer and to position the disconnector in the disengaged position of the disconnector hook relative to the hammer disconnect notch. A spring keeps tension on the reset lever urging the reset lever toward

the closed position. The reset lever isolates the hammer from the trigger disconnector assembly, preventing the hammer from striking the trigger disconnector assembly in the past cocked position of the hammer. The hammer tail of the hammer strikes the reset lever in the past-cocked position of the hammer at a location between the cam surface and the disconnector hook.

According to the principle of the invention, a trigger mechanism includes a trigger body having a trigger nose and a trigger pivot for pivotally coupling the trigger body to a firearm for movement of the trigger nose between set and released positions. A reset lever is mounted for pivotal movement between open and closed positions. A disconnector has a disconnector hook, and a disconnector pivot pivotally coupling the disconnector to the trigger pivot for movement of the disconnector hook between disengaged and engaged positions in response to pivotal movement of the trigger body between the set and released positions of the trigger nose, respectively. A hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer. The disconnector is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the disconnector to concurrently pivot the disconnector from the engaged position of the disconnector hook to the disengaged position of the disconnector hook and the trigger body from the released position of the trigger nose to the set position of the trigger nose

in preparation to be received by the trigger notch in the cocked position of the hammer when the reset lever moves from the open position to the closed position. A spring keeps tension on the reset lever urging the reset lever toward the closed position. The reset lever isolates the hammer from the trigger body and the disconnector, preventing the hammer from striking the trigger body and the disconnector in the past cocked position of the hammer.

According to the principle of the invention, a trigger mechanism includes a trigger body having a trigger nose and a trigger pivot for pivotally coupling the trigger body to a firearm for movement of the trigger nose between set and released positions. A reset lever is mounted for pivotal movement between open and closed positions. A disconnector has a disconnector lever, a disconnector hook, and a disconnector pivot pivotally coupling the disconnector to the trigger pivot for movement of the disconnector hook between disengaged and engaged positions in response to pivotal movement of the trigger body between the set and released positions of the trigger nose, respectively. A hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer. The disconnector lever of the disconnector is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the disconnector lever to concurrently pivot the disconnector from the engaged position of the disconnector hook to the disengaged position of the

disconnector hook and the trigger body from the released position of the trigger nose to the set position of the trigger nose in preparation to be received by the trigger notch in the cocked position of the hammer when the reset lever moves from the open position to the closed position. A spring keeps tension on the reset lever urging the reset lever toward the closed position. The reset lever isolates the hammer from the trigger body and the disconnector, preventing the hammer from striking the trigger body and the disconnector in the past cocked position of the hammer. The striking end of the hammer strikes the reset lever in the past-cocked position of the hammer at a location between the disconnector lever and the disconnector hook.

According to the principle of the invention, a trigger mechanism includes a trigger body having a trigger nose and a trigger pivot for pivotally coupling the trigger body to a firearm for movement of the trigger nose between set and released positions. A reset lever is mounted for pivotal movement between open and closed positions. A disconnector has a disconnector hook, a cam surface, and a disconnector pivot pivotally coupling the disconnector to the trigger pivot for movement of the disconnector hook between disengaged and engaged positions in response to pivotal movement of the trigger body between the set and released positions of the trigger nose, respectively. A hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer. The cam surface of the disconnector is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the

hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the cam surface to concurrently pivot the disconnector from the engaged position of the disconnector hook to the disengaged position of the disconnector hook and the trigger body from the released position of the trigger nose to the set position of the trigger nose in preparation to be received by the trigger notch in the cocked position of the hammer when the reset lever moves from the open position to the closed position. A spring keeps tension on the reset lever urging the reset lever toward the closed position. The reset lever isolates the hammer from the trigger body and the disconnector, preventing the hammer from striking the trigger body and the disconnector in the past cocked position of the hammer. The striking end of the hammer strikes the reset lever in the past-cocked position of the hammer at a location between the cam surface and the disconnector hook.

According to the principle of the invention, a trigger assembly with a hammer having a trigger notch, a trigger body has a trigger nose, a trigger tail, and a trigger, the trigger nose for receiving the trigger notch in a cocked position of the hammer and a set position of the trigger body and for releasing the trigger nose when the trigger body is moved a travel distance from the set position to a fired position, a disconnector coupled between the hammer and the trigger body, and a selector movable between a first position and a second position for adjusting the travel distance of the trigger body. The selector has a first stop aligned with the tail of the trigger body in the first position, and a second stop aligned with the tail of the trigger body in the second position. The first stop is separated from tail of the trigger body a first distance in the set position of the trigger body in the first position of the selector, and the second stop is separated from tail of the

trigger body a second distance in the set position of the trigger body in the second position of the selector. In the first position of the selector and the fired position of the trigger body the first distance between the first stop and the tail of the trigger body is closed and the tail contacts the first stop, and movement of the trigger body is arrested by the tail contacting the first stop. In the second position of the selector and the fired position of the trigger body the second distance between the second stop and the tail of the trigger body is closed and the tail contacts the second stop, and movement of the trigger body is arrested by the tail contacting the second stop. The second distance is less than the first distance, wherein the travel distance of the trigger body in the second position of the selector is less than the travel distance of the trigger body in the first position of the selector.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings:

FIG. 1 is a perspective view of a trigger mechanism constructed and arranged in accordance with the principle of the invention, the trigger mechanism including a trigger body, a disconnector, a hammer, a reset lever, and a selector, and the trigger mechanism being shown as it would appear in a safe mode of operation;

FIG. 2 is a view similar to that of FIG. 1 with portions thereof being shown in phantom outline for illustrative purposes;

FIG. 2A is a bottom perspective view of the trigger body, the disconnector, and the hammer of the embodiment of FIG. 1;

FIG. 3 is a partially exploded perspective view of the trigger body, the disconnector, the hammer, and the reset lever of the trigger mechanism of FIG. 1;

FIG. 4 is a view of the trigger body, the disconnector, the hammer, the assisted reset lever, and the selector of the trigger mechanism of FIG. 1 in a semi-automatic mode of operation;

FIG. 5 is a view similar to that of FIG. 4 illustrating the trigger mechanism as it would appear in an assisted reset semi-automatic mode of operation;

FIGS. 6-9 show a sequence of operation of the trigger body, the disconnector, the hammer, the reset lever, and the selector of the trigger mechanism of FIG. 1 in a semi-automatic mode of operation;

FIGS. 10-14 show a sequence of operation of the trigger body, the disconnector, the hammer, the reset lever, and the selector of the trigger mechanism of FIG. 1 in an assisted-reset semi-automatic mode of operation;

FIG. 15 is a fragmented end elevation view of the trigger mechanism of FIG. 1 illustrating contact between a cam of the selector and the reset lever in the semi-automatic mode of operation of the trigger assembly;

FIG. 16 is a fragmented end elevation view of the trigger mechanism of FIG. 1 illustrating contact between a cam of the selector and the reset lever in the assisted-reset semi-automatic mode of operation of the trigger assembly;

FIG. 17 is a side elevation view of the trigger body, the selector, and the hammer of the embodiment of FIG. 4 illustrating the selector in the semi-automatic mode of operation, and illustrating the trigger body in a set position holding the hammer in a cocked position;

FIG. 18 is a view of the embodiment of FIG. 17 illustrating the trigger body as it would appear in a pulled or fired position and a tail of the trigger body shown as it would appear contacting a first stop of the selector;

FIG. 19 is a side elevation view of the trigger body, the selector, and the hammer of the embodiment of FIG. 5 illustrating the selector in the assisted reset semi-automatic mode of operation, and illustrating the trigger body in a set position holding the hammer in a cocked position; and

FIG. 20 is a view of the embodiment of FIG. 19 illustrating the trigger body as it would appear in a pulled or fired position and a tail of the trigger body shown as it would appear contacting a second stop of the selector.

DETAILED DESCRIPTION

Known trigger mechanisms used with various semi-automatic firearms that fire a single round each time the trigger is pulled and that have select fire capabilities that permit selection between safe and semi-automatic modes of operation include a trigger assembly having a trigger, a hammer having a sear hook, a disconnector, and a sear assembly. Operation of such a mechanism is well known to those skilled in the art and will not be described in detail, other than to describe how, after firing, the hammer is pivoted rearwardly by the action of the bolt carrier. As the hammer is moved to a cocked position and beyond to a past-cocked position, from the cocked position the hammer disconnect notch clips past the disconnector hook of the disconnector and over-travels to the past-cocked position where the portion of the hammer having the sear hook strikes the disconnector which in turn imparts the energy from the striking hammer to a rear portion of the trigger assembly, causing the trigger to sharply move or snap forward to reset the trigger nose relative to the trigger notch formed in the pivot end of the hammer where the hammer is retained in the cocked position by the trigger nose preparatory to firing by another trigger pull. The over-travel of the hammer from the cocked position to the past-cocked position delays the trigger-to-hammer reset, which limits the speed of semi-automatic fire.

To overcome this problem, a trigger mechanism, generally designated 20, is provided. It will be understood that trigger mechanism 20 is intended to be employed with any of the various semi-automatic firearms that fire a single round each time the trigger is pulled and that have select fire capabilities. It will also be understood that trigger mechanism 20 is carried by a lower receiver of a firearm. A lower receiver is not

shown, as they are well known in the art and trigger mechanism 20 is carried in a conventional manner. Trigger mechanism 20 may also be formed as a drop-in trigger mechanism, as is the case with after-market trigger mechanisms.

This particular trigger mechanism 20 allows selection between safe, semi-automatic, and assisted-reset semi-automatic modes of fire or operation. The assisted-reset semi-automatic mode of operation is a form of a semi-automatic mode of operation. Looking in relevant part to FIGS. 1-5, trigger mechanism 20 includes a trigger assembly 21 having a trigger body 23 with a trigger nose 24 at a head 24A of trigger body 23, a notch 25 at a tail 25A, and a trough 26 formed therein extending from tail 25A of trigger body 23 across a pivot 28 to just short of trigger nose 24 at head 24A. Trigger nose 24 is a part of head 24A of trigger body 23, and notch 25 is a part of tail 25A of trigger body 23. A trigger 27 extends from trigger body 23 generally at pivot 28. A disconnector 30 is positioned within trough 26 and is pivotally coupled to trigger assembly 21 at pivot 28. Disconnector 30 is a semi-automatic disconnector and is coupled between hammer 40 and trigger body 23. Disconnector 30 includes a rearwardly extending disconnector lever 32, and an upwardly extending disconnector hook 33. Disconnector lever 32 is positioned within trough 26 and includes a cam surface 35. Disconnector 30 pivots about a pivot or pivot point 38 denoted in FIG. 3, concurrent with pivot 28 of trigger assembly 22 as is known in the art. In this trigger mechanism 20, trigger body 23 and disconnector 30 concurrently pivot about pivot 28 and pivot point 38. Trigger assembly 21 has the customary and well-known trigger spring that acts on trigger body 23 so as to keep constant tension on trigger body 23 and thus trigger 27, the details of which are well-known to the skilled person. According to this disclosure, trigger body 23 and its various

components and disconnector 30 and its various components cooperate to form a trigger disconnector assembly, which is denoted generally at 39.

Trigger mechanism 20 also includes a hammer 40 coupled for pivotal movement at a pivot 42 defined at a pivot end 43 of hammer 40 from a forward or firing position rearwardly to a cocked position and beyond to a past-cocked position as the rearward most position. Trigger assembly 21 has the customary and well-known hammer spring 48 that acts on hammer 40 so as to keep constant tension on hammer 40, the details of which are well-known to the skilled person. Hammer 40 further includes a striking surface 44 formed in a striking end 45. Striking end 45 opposes pivot end 43, and has a hammer tail 46 opposite to striking surface 44. A trigger notch 49 is formed in pivot end 43. Trigger nose 24 is received in trigger notch 49, holding hammer 40 in the cocked position prior to firing. In this trigger mechanism 20, trigger notch 49 is formed perpendicular to the axis of rotation, directly in line with the center of pivot point 42.

Trigger mechanism 20 further includes an assisted-reset lever 50. Assisted-reset or reset lever 50 is positioned within trough 26 proximate to notch 25 of tail 25A and rearwardly of, or otherwise behind, disconnector lever 32 of disconnector 30 between selector 70 and disconnector lever 32 of disconnector 30 of disconnector assembly 39. Reset lever 50 includes two arms 52 and 53 connected at an angle at an intermediate portion, mid-section, or middle 54 of reset lever 50. Arms 52 and 53 are lever arms and are angularly offset relative to one another like a boomerang. In this reset lever 50, the angle between arms 52 and 53 is approximately 110 degrees, meaning 110 degrees +/- 1-6 degrees variation as may be desired. Reset lever 50 is pivotally coupled to trigger body 23 of trigger assembly 21 at a pivot 56. Arm 52 is a rearwardly extending arm that

extends rearwardly through trough 26 from pivot 56 at tail 25A of trigger body 23. Arm 53 is an upwardly extending arm that extends upwardly from pivot 56 and trough 26 at tail 25A of trigger body 23. Reset lever 50 pivots or pivotally moves at pivot 56 in the directions of double arrowed line A in FIG. 1 and 2 between what is considered an inoperative position as shown in FIGS. 1, 2, 4, and 6-9, and what is considered an operative position as shown in FIGS. 3, 5, and 10-14 relative to the trigger disconnector assembly 39 and, more specifically, relative to cam surface 35 of disconnector 30 of trigger disconnector assembly 39.

In the inoperative position of reset lever 50, arm 53 is in an inoperative position, which is an aft or rearward upright position toward selector 70 and away from trigger disconnector assembly 39. In a further and more specific aspect, in the inoperative position of reset lever 50, arm 53 is in an inoperative position, which is an aft or rearward upright position toward selector 70 and away from cam surface 35 of disconnector 30 of trigger disconnector assembly 39. In the inoperative position of reset lever 50, arm 53 is de-united from or otherwise not in contact with cam surface 35 and is held there by selector 70. In the operative position of reset lever 50, arm 53 is in an operative position, which is a fore or forward upright position away from selector 70 and toward and in contact against disconnector assembly 39. In a further and more specific aspect, in the operative position of reset lever 50, arm 53 is in an operative position, which is a fore or forward upright position away from selector 70 and toward and in contact against cam surface 35 of disconnector 30 of trigger disconnector assembly 39.

A reset lever spring 60 is coupled between reset lever 50 and trigger body 23 of trigger assembly 21. Reset lever spring 60 keeps constant tension on reset lever 50.

Here, reset lever spring 60 is a compression spring having active coils with a constant moduli of elasticity encircled about pivot 56, a tag end 61 connected to arm 52, and a tag end 62 connected to trigger body 23 of trigger assembly 21. Tag end 61 is received in and against a notch 61A formed in reset lever 50 between middle 54 and arm 52 and there tag end 61 is held. Tag end 62 extends downwardly through trough 26 from pivot 56 and through a small opening 62A in a bottom wall of trigger body 23 and there tag end 62 is held. Reset lever spring 60 constantly acts on reset lever 50 keeping constant tension on reset lever 50 constantly biasing/urging/tensioning reset lever 50 from its inoperative position relative to trigger disconnector assembly 39 to its operative position relative to trigger disconnector assembly 39.

Trigger mechanism 20 is a select fire trigger mechanism that has safe, semi-automatic, and assisted-reset semi-automatic modes of fire or operation, which are set or activated by a selector 70. Selector 70 is mounted for rotation so to rotate and is situated in notch 25 of trigger body 23 and has a handle 71 used to rotate selector 70 between different positions including a position corresponding to a safe mode of operation as in FIG. 1, another position corresponding to a semi-automatic mode of fire or operation as in FIG. 4, and yet another position corresponding to an assisted-reset semi-automatic mode of fire or operation as in FIG. 5, wherein these positions of selector 70 are different from one another. Trigger mechanism 20 is rendered inoperative in the safe mode of selector 70, trigger mechanism 20 is rendered operative for semi-automatic fire in the semi-automatic mode of selector 70, and trigger mechanism 20 is rendered operative for assisted-reset semi-automatic fire in the assisted-reset semi-automatic mode of selector 70.

FIG. 1 shows trigger body 23 and disconnector 30 that form trigger disconnector assembly 39, hammer 40, reset lever 50, and selector 70 of trigger mechanism 20 in the safe mode of operation. In FIG. 1, selector 70 is in the safe mode or safe setting and trigger nose 24 is received in trigger notch 49, holding hammer 40 in the cocked position. In the safe mode position of selector 70, trigger mechanism 20 is disabled and incapable of being fired. At the same time, selector 70 engages arm 52 of reset lever 50 holding reset lever 50 in its inoperative position.

Selector 70 is rotated in the direction of arrowed line B in FIG. 1 from the safe mode or safe setting to the semi-automatic mode or semi-automatic setting in FIG. 4 to adjust trigger mechanism 20 from the safe mode of operation as in FIG. 1 to the semi-automatic mode of operation as in FIG. 4. At the same time, cam 75 of selector 70 contacts/abuts/engages arm 52 of reset lever 50, as shown in FIG. 15, so as to act on arm 52 holding reset lever 50 in its inoperative position. For reference purposes, cam 75 is illustrated in FIGS. 17, 19, and 20. As arm 52 is the thing against which cam 75 of selector 70 contacts, arm 52 of reset lever 50 is an abutment of reset lever 50 on or against which cam 75 of selector 70 abuts or contacts. In FIG. 4, selector 70 is in the semi-automatic mode or semi-automatic setting and trigger nose 24 is received in trigger notch 49, holding hammer 40 in the cocked position in preparation for firing. In the semi-automatic mode of operation of trigger mechanism 20 in preparation for firing, trigger disconnector assembly 39 is in a charged or pre-pulled orientation. In this charged or pre-pulled orientation, trigger body 23 and trigger nose 24 are each in a set position. In this set position of trigger body 23, trigger nose 24 at head 24A is received in trigger notch 49 and disconnector hook 33 is in a disengaged position being disengaged

from or otherwise relative to hammer disconnect notch 47 formed in hammer 40 between pivot end 43 and striking end 45 allowing forward movement of hammer 40 upon pulling trigger 27. Upon pulling trigger 27 so as to move trigger body 23 and trigger 27 a trigger pull or pulling travel distance in the semi-automatic mode of operation from the set position holding hammer 40 to the pulled or fired position releasing hammer 40, trigger disconnector assembly 39 is pivoted from the charged orientation to a discharged orientation, lowering trigger nose 24 out of trigger notch 49 from the set position to a released position, releasing hammer 40 and moving disconnector hook 33 forwardly from the disengaged position to an engaged position, as shown in FIG. 6, causing hammer 40 pivot forwardly in the direction of arrowed line C to a firing position shown in FIG. 7 to fire a round, while at the same time raising tail 25A of trigger body 23 toward selector 70.

After a round has been fired, the rearwardly moving bolt carrier engages hammer 40 and pivots it rearwardly in the direction of arrowed line D in FIG. 7 toward the cocked position in FIG. 8 and beyond the cocked position to the past-cocked position in FIG. 9. With trigger 27 pulled and held in its pulled or fired position locating disconnector hook 33 in the engaged position as in FIG. 8, hammer disconnect notch 47 of the rearwardly pivoting hammer 40 clips past disconnector hook 33 with a sharp, glancing blow as hammer 40 moves toward and beyond the cocked position in FIG. 8 to the past-cocked position in FIG. 9. In the past-cocked position of hammer 40 and the discharged orientation of trigger disconnector assembly 39 in FIG. 9 with trigger 27 pulled and held in its pulled/fired position, disconnector hook 33 engages hammer disconnect notch 47 in the engaged position of disconnector hook 33 preventing forward movement of hammer

40. Forward movement of hammer 40 is thus arrested by disconnector hook 33 engaging hammer disconnect notch 47. This prevents automatic fire. When trigger 27 is released, trigger body 23 and trigger 27 pivot a trigger reset or resetting travel distance in the semi-automatic mode of operation from the pulled/fired position of trigger body 23 and trigger 27 to the set position of trigger body 23 and trigger 27, whereby trigger disconnector assembly 39 pivots from the discharged orientation to the charged orientation in FIG. 4, in which trigger 27 is moved forwardly, trigger nose 24 at head 24A is raised to its set position received in trigger notch 49, holding hammer 40 in the cocked position, and tail 25A is lowered away from selector 70. At the same time, disconnector hook 33 is pivoted rearwardly from the engaged position to the disengaged position removing it from engagement with hammer disconnect notch 47. Forward movement of hammer 40 is arrested by trigger nose 24 engaging trigger notch 49. Hammer 40 is thus retained in the cocked position by trigger nose 24, preparatory to firing by another trigger pull.

After disconnector hook 33 clips past hammer disconnect notch 47 in response to hammer 40 moving into the past-cocked position beyond the cocked position, hammer 40 over-travels in the past-cocked position, as indicated by the phantom outline of hammer 40 in FIG. 9, misses reset lever 50, including arm 53, in the inoperative position of reset lever 50, and strikes disconnector 30 which in turn imparts the energy from the striking hammer 40 to a rear portion of trigger disconnector assembly 39 of trigger assembly 21, causing trigger disconnector assembly 39 to reset, namely, to pivot from the discharged position to the charged position. Once in the charged position, disconnector hook 33 is in its disengaged position free from interfering with hammer disconnect notch 47 and trigger nose 24 is in its set position in preparation to be received by the trigger notch 49

in the cocked position of hammer 40. As hammer 40 then pivots forwardly from the past-cocked position toward the cocked position, hammer disconnect notch 47 passes by disconnector hook 33 and trigger nose 24 is received trigger notch 49, holding hammer 40 in the cocked position preparatory to firing by another trigger 27 pull. In the inoperative position of reset lever 50 in the semi-automatic mode of operation of trigger mechanism 20, selector 70 holds reset lever 50 out-of-play away from hammer 40 preventing hammer 40 from contacting/striking or otherwise interacting with reset lever 50 during semi-automatic firing.

FIG. 17 is a side elevation view of trigger body 23, selector 70, and hammer 40 oriented as in FIG. 4 illustrating selector 70 in the semi-automatic mode of operation, and illustrating trigger body 23 in the set position holding hammer 40 in the cocked position. Disconnector 30 is not shown in FIG. 17, but is referenced in the figures described above. Selector 70 has a stop body 78. Stop body 78 is located near, above, and opposite to, notch 25 of tail 25A of trigger body 23. Stop body 78 includes two stops, including stop 78A and stop 78B. Stops 78A and 78B are surfaces of stop body 78. Here, stops 78A and 78B are perpendicular relative to each other.

In a first position of selector 70 corresponding to the semi-automatic mode of operation of selector 70 as in FIG. 17, stop 78A is registered with, meaning aligned with, tail 25A, specifically notch 25 of tail 25A. With trigger nose 24 received in trigger notch 49 holding hammer 40 in the cocked position in preparation for firing, a distance D1 is defined between semi-automatic stop 78A and tail 25A, specifically notch 25 of tail 25A. Again, in the semi-automatic mode of operation of trigger mechanism 20 in preparation for firing trigger body 23 and trigger nose 24 are each in a set position, and in this set

position of trigger body 23 trigger nose 24 at head 24A is received in trigger notch 49 in preparation for pulling trigger 27 to release hammer 40. Upon pulling trigger 27 so as to move trigger body 23 and trigger 27 the trigger pulling travel distance in the semi-automatic mode of operation from the set position holding hammer 40 to the pulled/fired position releasing hammer 40, trigger nose 24 is lowered out of trigger notch 49 from the set position to a released position, releasing hammer 40, while at the same time raising tail 25A of trigger body 23 toward stop 78A of stop body 78 of selector 70 closing distance D1 between notch 25 of tail 25A of trigger body 23 so as to bring notch 25 of tail 25A of trigger body 23 into direct contact against stop 78A of stop body 78. Upward movement of tail 25A of trigger body 23 is thus arrested by notch 25 of tail 25A contacting stop 78A of stop body 78 which, in turn, arrests movement of trigger body 23, or in other words limits or otherwise arrests the pivotal movement of trigger 27 and trigger body 23 past the pulled/fired position in the semi-automatic mode of operation. Trigger body 23 and trigger 27 in turn move the trigger reset travel distance in the semi-automatic mode of operation from the pulled position to the set position to hold hammer 40 in the cocked position preparatory to firing another round as described above. In the semi-automatic mode of operation of trigger mechanism 20, the trigger pulling and trigger reset travel distances of trigger body 23 and trigger 27 are equal.

Assisted-reset semi-automatic firing is achieved by utilizing selector 70, which is rotated in the direction of arrowed line E in FIG. 4 from the semi-automatic mode or semi-automatic setting to the assisted-reset semi-automatic mode or assisted-reset semi-automatic setting in FIG. 5 to adjust trigger mechanism 20 from the semi-automatic mode of operation as in FIG. 4 to the assisted-reset semi-automatic mode of operation as in

FIG. 5. At the same time, cam 75 of selector 70 contacts/abuts/engages arm 52, as seen in FIG. 16, so as to act on arm 52 of reset lever 50 pivoting reset lever 50 from its inoperative position defining the inoperative position of arm 53 to its operative position defining the operative position of arm 53, resulting in the movement of arm 53 from the aft or rearward upright position toward selector 70 and away from cam surface 35 of disconnector 30 to the fore of forward upright position away from selector 70 and toward and in contact against cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39. The constant tension on reset lever 50 provided by reset lever spring 60 constantly biasing/urging/tensioning reset lever 50 from its inoperative position relative to trigger disconnector assembly 39 to its operative position relative to trigger disconnector assembly 39 pivots reset lever from its inoperative position to its operative position in response to cam 75 acting on arm 52 in response to rotation of selector 70 from its semi-automatic mode or semi-automatic setting to its assisted-reset semi-automatic mode or assisted-reset semi-automatic setting.

The contact between cam surface 35 and arm 53 of reset lever 50 is a mechanical coupling. This mechanical coupling defines a mechanical communication between arm 53 of reset lever 50 and trigger disconnector assembly 39 and, more specifically, between arm 53 of reset lever 50 and disconnector 30 and, still more specifically, between arm 53 of reset lever 50 and disconnector lever 32 of disconnector 30 and, yet still more specifically, between arm 53 of reset lever 50 and cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39, all according to various aspects of the invention. As a result of the contact between cam surface 35 and arm 53, trigger disconnector assembly 39 is in mechanical communication with reset lever 50,

disconnector 30 is in mechanical communication with reset lever 50, disconnector lever 32 is in mechanical communication with reset lever 50, and cam surface 35 is in mechanical communication with reset lever 50. As arm 53 is the thing that engages cam surface 35 in the operative position of reset lever, arm 53 of reset lever 50 is an abutment of reset lever 50 that contacts cam surface 35 in the operative position of reset lever 50.

In the inoperative position of reset lever 50 in the semi-automatic mode of operation of trigger mechanism 20, reset lever 50 is out of play, whereby hammer 40 does not contact or otherwise strike or interact with reset lever 50 during semi-automatic firing. In the operative position of reset lever 50, reset lever 50 is in play being operatively coupled to hammer tail 46 of striking end 45 of hammer 40, wherein reset lever 50 is positioned to be contacted or struck by hammer tail 40 of striking end 45 of hammer 40 in the past-cocked position of hammer 40 during assisted-reset semi-automatic firing.

In FIG. 5, selector 70 is in the assisted-reset semi-automatic mode or assisted-reset semi-automatic setting and trigger nose 24 of head 24A is received in trigger notch 49, holding hammer 40 in the cocked position in preparation for firing. In the assisted-reset semi-automatic mode of operation of trigger mechanism 20, trigger disconnector assembly 39 is a charged or pre-pulled orientation. In this charged or pre-pulled orientation, trigger body 23 and trigger nose 24 at head 24A are each in a set position. In this set position of trigger body 23, trigger nose 24 at head 24A received in trigger notch 49 and disconnector hook 33 is in the disengaged position being disengaged relative to hammer disconnect notch 47, allowing forward movement of hammer 40 upon pulling trigger 27. Upon pulling trigger 27 so as to move trigger body 23 a trigger pulling or pull

travel distance in the assisted-reset mode of operation from its set position holding hammer 40 to its pulled/fired position in the assisted-reset semi-automatic mode of operation releasing hammer 40, trigger disconnector assembly 39 is pivoted from the charged orientation to the discharged orientation, lowering trigger nose 24 out of trigger notch 49 from the set position to a released position, releasing hammer 40 and moving disconnector hook 33 forwardly from the disengaged position to an engaged position, as shown in FIG. 10, causing hammer 40 pivot forwardly in the direction of arrowed line F to a firing position shown in FIG. 11 to fire a round, while at the same time raising tail 25A of trigger body 23 toward selector 70.

After a round has been fired, the rearwardly moving bolt carrier engages hammer 40 and pivots it rearwardly in the direction of arrowed line G in FIG. 11 toward the cocked position in FIG. 12 and beyond the cocked position to the past-cocked position in FIG. 13. With trigger 27 pulled and held in its pulled/fired position locating disconnector hook 33 in the engaged position as in FIG. 12, hammer disconnect notch 47 of the rearwardly pivoting hammer 40 clips past disconnector hook 33 with a sharp, glancing blow as hammer moves toward and beyond the cocked position in FIG. 12 to the past-cocked position in FIG. 13. In the past-cocked position of hammer 40 and the discharge orientation of trigger disconnector assembly 39 in FIG. 13 with trigger 27 pulled and held in its pulled/fired position, disconnector hook 33 is positioned to engage hammer disconnect notch 47 in the engaged position of disconnector hook 33 for preventing forward movement of hammer 40. Forward movement of hammer 40 is thus arrested by disconnector hook 33 engaging hammer disconnect notch 47. This prevents automatic fire. When trigger 27 is released, trigger body 23 and trigger 27 pivot a trigger resetting

or reset travel distance in the assisted-reset semi-automatic mode of operation from the pulled position of trigger body 23 and trigger 27 to the set position of trigger body 23 and trigger 27, whereby trigger disconnector assembly 39 pivots from the discharged orientation to the charged orientation in FIG. 5, in which trigger 27 is moved forwardly, trigger nose 24 at head 24A is moved to its set position received in trigger notch 49, holding hammer 40 in the cocked position, and tail 25A is lowered away from selector 70. At the same time, disconnector hook 33 is pivoted rearwardly from the engaged position to the disengaged position removing it from engagement with hammer disconnect notch 47. Forward movement of hammer 40 is arrested by trigger nose 24 engaging trigger notch 49. Hammer 40 is thus retained in the cocked position by trigger nose 24, preparatory to firing by another trigger pull.

Reset lever 50 pivots at pivot 56 between inoperative and operative positions relative to cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39. The constant tension applied by reset lever spring 60 (FIGS. 2 and 3) keeps constant tension on reset lever 50 constantly urging/biasing reset lever 50 into its operative position in the assisted-reset semi-automatic mode or setting of selector 70, in accordance with the principle of the invention. In response to movement of reset lever 50 from its inoperative position to its operative position in response to movement of selector 70 to the assist-reset semi-automatic setting from either of the safe setting or the semi-automatic setting of selector 70, arm 53 moves from the inoperative position thereof as in FIG. 4 to the operative position thereof as in FIG. 5 in direct contact against cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39. This contact of arm 53 of reset lever 50 directly against cam surface 35 is a

mechanical coupling that forms the mechanical communication as discussed and defined above.

In the inoperative position of arm 53, arm 53 is pivoted rearwardly with respect to cam surface 35 and trigger disconnector assembly 39 in the direction of selector 70, and is spaced-apart from, and not in contact with, cam surface 35 of disconnector lever 32 of disconnector 30. In the operative position of arm 53, arm 53 is pivoted in the opposite direction forwardly with respect to cam surface 35 of disconnnector lever 32 of disconnector 30 of trigger disconnector assembly 39 in the direction of pivot 28 and into direct contact against cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39. And so in the inoperative position of reset lever 50, arm 53 is also in an inoperative position and is made to extend upright and rearward toward selector 70 and away from hammer tail 46 of hammer 40 in the cocked position of hammer 40, and in this position cannot be contacted or struck by hammer tail 46 of striking end 45 of hammer 40 during semi-automatic firing. As such, hammer 40 misses reset lever 50, including arm 53, as hammer 40 travels downwardly in the past-cocked position. In the operative position of reset lever 50, arm 53 is also in an operative position and is made to extend upright and forward from selector 70 toward hammer tail 46 of hammer 40 in the cocked position of hammer 40, and in this position is operatively coupled to hammer tail 46 of hammer 40, wherein arm 53 of reset lever 50 is positioned to be contacted or struck by hammer tail 46 of striking end 45 of hammer 40 in the past-cocked position of hammer 40 during assisted-reset semi-automatic firing. Again, because the constant tension applied by reset lever spring 60 (FIGS. 2 and 3) keeps constant tension on reset lever 50 constantly urging/biasing reset lever 50 toward its

operative position in the assisted-reset semi-automatic mode or setting of selector 70, the constant tension applied by reset lever spring 60 tends to hold reset lever 50 in its operative position in the assisted-reset semi-automatic mode of operation.

In the operative position of reset lever 50 as explained above, arm 53 is in contact with cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39, and this contact persists or is otherwise maintained by reset lever spring 60 constantly acting on reset lever 50 during the pivoting movement of trigger disconnector assembly 39 between its charged and discharged positions. Cam surface 35 acts against arm 53 in response to movement of trigger disconnector assembly 39 between its charged and discharged positions. This contact interaction between cam surface 35 and arm 53 in the operative position of reset lever 50 moves reset lever 50 in the direction of double arrowed line H in FIG. 5 toward the inoperative position of reset lever 50 to an open position of reset lever 50 in the discharged position of trigger disconnector assembly 39 as in FIG. 10, and in the opposite direction away from the inoperative position of reset lever 50 to a closed position of reset lever in the charged position of trigger disconnector assembly 50 as in FIG. 5. And so in the operative position of reset lever 50, reset lever 50 moves between its open and closed positions relative to trigger disconnector assembly 39 and, more particular, relative to cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39, in response to movement of trigger disconnector assembly 39 between the discharged and charged positions. In the operative position of reset lever 50, reset lever spring 60 keeps constant tension on reset lever 50 constantly urging/biasing reset lever 50 from its open position toward its closed position in the assisted-reset semi-automatic mode or setting of selector 70, and the constant

tension applied by reset lever spring 60 thus tends to hold reset lever 50 in its closed position in the assisted-reset semi-automatic mode of operation. At the same time, reset lever 50 remains in its operative position in both its open and closed positions in the discharged and charged positions of trigger disconnector assembly 39 in the assisted-reset semi-automatic mode of operation of trigger assembly 20, in accordance with the principle of the invention.

The open position of reset lever 50 in the operative position of reset lever 50 is an open position of arm 53, and the closed position of reset lever 50 in the operative position of reset lever 50 is a closed position of arm 53. In response to movement of reset lever 50 between its open and closed positions in response to movement of trigger disconnector assembly 39 between its discharged and charged positions, arm 53, in turn, moves between open and closed positions relative to trigger disconnector assembly 39 and, more particular, relative to cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39. In the open position of arm 53, arm 53 is pivoted rearwardly and upwardly with respect to cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39 in the direction of selector 70. In the closed position of arm 53, arm 53 is pivoted forwardly and downardly from the open position thereof with respect to cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39 in the direction of pivot 28. Because reset lever spring 60 keeps constant tension on reset lever 50 constantly urging/biasing reset lever 50 from its open position toward its closed position in the assisted-reset semi-automatic mode or setting of selector 70, the constant tension applied by reset lever spring 60 thus tends to hold arm 53 in its closed position in the assisted-reset semi-automatic mode of

operation. At the same time, arm 53 remains in its operative position in both its open and closed positions in the discharged and charged positions of trigger disconnector assembly 39 in the assisted-reset semi-automatic mode of operation of trigger assembly 20.

In the operation of reset lever 50 in the assisted-reset semi-automatic mode of operation of trigger mechanism 20, after a round has been fired rearwardly moving bolt carrier engages hammer 40 and pivots it rearwardly in the direction of arrowed line G in FIG. 11 toward the cocked position in FIG. 12 and beyond the cocked position to the past-cocked position in FIG. 13. With trigger 27 pulled and held in its pulled/fired position as in FIG. 13, as hammer 40 moves beyond the cocked position to the past-cocked position in FIG. 13, hammer disconnect notch 47 of the rearwardly pivoting hammer 40 clips past disconnector hook 33 with a sharp, glancing blow as hammer 40 moves toward and beyond the cocked position in FIG. 12 to the past-cocked position in FIG. 13, hammer tail 46 of striking end 45 of hammer 40 encounters/strikes arm 53 of reset lever 50 as shown in FIG. 13, in this example at a location above cam surface 35 and, moreover, between cam surface 35 of disconnector lever 32 and disconnector hook 33, which in turn imparts the energy from the striking hammer 40 to arm 53 of reset lever 50. This, in turn, pivots reset lever 50 from the open position to the closed position at the same time moving arm 53 from the open position in FIG. 13 to the closed position in FIG. 14 as hammer 40 over-travels downwardly in the direction of arrowed line I in FIG. 13 in the past-cocked position. At the same time, arm 53 of reset lever 50 engages cam surface 35 of disconnector lever 32 of disconnector 30 of trigger disconnector assembly 39 which in turn imparts the energy from the pivoting reset lever 50 to disconnector 30 of disconnector assembly 39, whereby arm 53 acts on cam surface 35 pivoting trigger

disconnector assembly 39, including trigger body 23 at pivot 28 and disconnector 30 at pivot point 38 concurrent with pivot 28, from the discharged orientation to the charged orientation when arm 53 moves via the pivoting of reset lever 50 from the open position to the closed position, raising trigger nose 24 of head 24A to its set position in preparation to be received by trigger notch 49 in the cocked position of hammer 40 and to position disconnector 30 in the disengaged position of disconnector hook 33 relative to hammer disconnect notch 49, as shown in FIG. 14, while at the same time lowering tail 25A of trigger body 23 away from selector 70. At the same time, disconnector hook 33 is pivoted rearwardly from the engaged position to the disengaged position removing it from engagement with hammer disconnect notch 47. Forward movement of hammer 40 is arrested by trigger nose 24 engaging trigger notch 49. Hammer 40 is thus retained in the cocked position by trigger nose 24, preparatory to firing by another trigger pull. And so in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 trigger disconnector assembly 39 is in mechanical communication with reset lever 50, whereby movement of reset lever 50 from its open position to its closed position via the action of hammer 40 urges/imparts corresponding movement of disconnector assembly 39 from the discharged orientation to the charged orientation.

According then to the principle of the invention, in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 trigger disconnector assembly 39 is in mechanical communication with reset lever 50. Striking end 45 of hammer 40 strikes reset lever 50 in the past-cocked position of hammer 40 pivoting reset lever 50 from the open position to the closed position, and reset lever 50 in turn acts on trigger disconnector assembly 39 to pivot trigger disconnector assembly 39 from the discharged orientation to

the charged orientation when reset lever 50 moves from the open position to the closed position, to position trigger nose 24 in the set position in preparation to be received by trigger notch 49 in the cocked position of hammer 40 and to position disconnector 30 in the disengaged position of disconnector hook 33 relative to hammer disconnect notch 47, and to lower tail 25A of trigger body 23 away from selector 70.

In another aspect according to the principle of the invention, in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 cam surface 35 of trigger disconnector 39 assembly is in mechanical communication with reset lever 50. Hammer tail 46 of striking end 45 of hammer 40 strikes reset lever 50 in the past-cocked position hammer 40 pivoting reset lever 50 from the open position to the closed position, and reset lever 50 in turn acts on cam surface 35 to pivot trigger disconnector assembly 39 from the discharged orientation to the charged orientation when reset lever 50 moves from the open position to the closed position, to position trigger nose 24 in the set position in preparation to be received by trigger notch 49 in the cocked position of hammer 40 and to position disconnector 30 in the disengaged position of disconnector hook 33 relative to hammer disconnect notch 47, and to lower tail 25A of trigger body 23 away from selector 70.

In yet another aspect according to the principle of the invention, in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 disconnector 30 is in mechanical communication with reset lever 50. Striking end 45 of hammer 40 strikes reset lever 50 in the past-cocked position of hammer 40 pivoting reset lever 50 from the open position to the closed position, and reset lever 50 in turn acts on disconnector 30 to concurrently pivot disconnector 30 from the engaged position of disconnector hook 33 to

the disengaged position of disconnector hook 33 and trigger body 23 from the released position of trigger nose 24 to the set position of trigger nose 24 in preparation to be received by trigger notch 49 in the cocked position of hammer 40 while at the same time lowering tail 25A of trigger body 23 away from selector 70.

In yet still another aspect according to the principle of the invention, in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 disconnector lever 32 of disconnector 30 is in mechanical communication with reset lever 50. Striking end 45 of hammer 40 strikes reset lever 50 in the past-cocked position of hammer 40 pivoting reset lever 50 from the open position to the closed position, and reset lever 50 in turn acts on disconnector lever 32 to concurrently pivot disconnector 30 from the engaged position of disconnector hook 33 to the disengaged position of disconnector hook 33 and trigger body 23 from the released position of trigger nose 24 to the set position of trigger nose 24 in preparation to be received by trigger notch 49 in the cocked position of hammer 40 while at the same time lowering tail 25A of trigger body 23 away from selector 70.

In still a further aspect according to the principle of the invention, in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 cam surface 35 of disconnector 30 is in mechanical communication with reset lever 50. Striking end 45 of hammer 40 strikes reset lever 50 in the past-cocked position of hammer 40 pivoting reset lever 50 from the open position to the closed position, and reset lever 50 in turn acts on cam surface 35 to concurrently pivot disconnector 30 from the engaged position of disconnector hook 33 to the disengaged position of disconnector hook 33 and trigger body 23 from the released position of trigger nose 24 to the set position of trigger nose 24

in preparation to be received by trigger notch 49 in the cocked position of hammer 40 while at the same time lowering tail 25A of trigger body 23 away from selector 70.

In sum, arm 53 of reset lever 50 intercepts hammer 40 in the past-cocked position of hammer 40 just after hammer disconnect notch 47 of the rearwardly pivoting hammer 40 clips past disconnector hook 33 with a sharp, glancing blow as hammer 40 moves toward and beyond the cocked position in FIG. 12 to the past-cocked position in FIG. 13. The contact interaction between hammer 40 and reset lever 50 isolates hammer 40 from trigger disconnector assembly 39. This prevents hammer 40 from striking trigger disconnector assembly 39 in the past cocked position of hammer 40, including trigger body 23, disconnector 30, disconnector lever 32, and cam surface 35. The interaction of reset lever 50 between hammer 40 and trigger disconnector assembly 39 in the various aspects discussed above, assists in resetting trigger disconnector assembly 39 from its discharged position to its charged position in the past-cocked position of hammer 40. The interaction of reset lever 50 between hammer 40 and trigger disconnector assembly 39 according to the various aspects discussed herein is maintained in the over-travel of hammer 40 in the past cocked position, and this accelerates the resetting of trigger disconnector assembly 39 from the discharged position to the charged position because arm 53 of reset lever 50 is acting on cam surface 35 to pivot trigger disconnector assembly 39 from the discharged position to the charged position throughout the past-cocked over-travel of hammer 40. Downward movement of hammer 40 in the past-cocked position is eventually arrested by hammer tail 46 engaging arm 53 in the closed position of arm 53 in the closed position of reset lever 50, according to the principle of the invention, at which point hammer 40 snaps forwardly. Once trigger disconnector

assembly 39 is in the charged position, disconnector hook 33 is in its disengaged position free from interfering with hammer disconnect notch 47 and trigger nose 24 is in its set position in preparation to be received by the trigger notch 49 in the cocked position of hammer 40. As hammer 40 then pivots forwardly from the past-cocked position toward the cocked position, hammer disconnect notch 47 passes by disconnector hook 33 and trigger nose 24 is received trigger notch 49 as in FIG. 5, holding hammer 40 in the cocked position resetting trigger 27 of trigger body 23 to hammer 40 preparatory to firing by another trigger 27 pull. This is the trigger-to-hammer assisted reset feature of the assisted-reset semi-automatic mode of operation of trigger mechanism 20. The accelerated resetting of trigger disconnector assembly 39 from the discharged position to the charged position resulting from the interaction of reset lever 50 between trigger disconnector assembly 39 and hammer 40 in the past-cocked position quickens the rate of semi-automatic fire in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 and allows for faster trigger pulls between each fired round, which is particularly advantageous, particularly when a faster rate of semi-automatic fire is required, such as in combat situations and competitive shooting events.

FIG. 19 is a side elevation view of trigger body 23, selector 70, and hammer 40 oriented as in FIG. 5 illustrating selector 70 in the assisted-reset semi-automatic mode of operation, and illustrating trigger body 23 in the set position holding hammer 40 in the cocked position. Disconnector 30 is not shown in FIG. 17, but is shown and referenced in FIGS. 1-13. Selector 70 has stop body 78. As previously described, stop body 78 is located near, above, and opposite to, notch 25 of tail 25A of trigger body 23, stop body

78 includes two stops, including stop 78A and stop 78B, stops 78A and 78B are surfaces of stop body 78, and here stops 78A and 78B are perpendicular relative to each other.

In the first position of selector 70 corresponding to the semi-automatic mode of operation of selector 70 as in FIG. 17, stop 78A is registered with, meaning aligned with, notch 25 of tail 25A. In a second position of selector 70 corresponding to the assisted-reset semi-automatic mode of operation of selector 70 as in FIG. 17, stop 78B is registered with, meaning aligned with, tail 25A, specifically notch 25 of tail 25A. With trigger nose 24 received in trigger notch 49 holding hammer 40 in the cocked position in preparation for firing, a distance D2 is defined between semi-automatic stop 78B and tail 25A, specifically notch 25 of tail 25A. Again, in the assisted-reset semi-automatic mode of operation of trigger mechanism 20 in preparation for firing trigger body 23 and trigger nose 24 are each in a set position, and in this set position of trigger body 23 trigger nose 24 at head 24A is received in trigger notch 49 in preparation for pulling trigger 27 to release hammer 40. Upon pulling trigger 27 so as to move trigger body 23 and trigger 27 the trigger pulling travel distance in the assisted-reset semi-automatic mode of operation from the set position holding hammer 40 to the pulled/fired position releasing hammer 40, trigger nose 24 is lowered out of trigger notch 49 from the set position to a released position, releasing hammer 40, while at the same time raising tail 25A of trigger body 23 toward stop 78B of stop body 78 of selector 70 closing distance D2 between notch 25 of tail 25A of trigger body 23 so as to bring notch 25 of tail 25A of trigger body 23 into direct contact against stop 78B of stop body 78. Upward movement of tail 25A of trigger body 23 is thus arrested by notch 25 of tail 25A contacting stop 78B of stop body 78 which, in turn, and arrests movement of trigger body 23, or in other words limits or

otherwise arrests the pivotal movement of trigger 27 and trigger body 23 past the pulled/fired position in the assisted-reset semi-automatic mode of operation. Trigger body 23 and trigger 27 in turn move the trigger reset travel distance in the assisted-reset semi-automatic mode of operation from the pulled position to the set position. In the assisted-reset semi-automatic mode of operation of trigger mechanism 20, the trigger pulling and trigger reset travel distances of trigger body 23 and trigger 27 are equal.

Distance D1 denoted in FIGS. 15 and 17 is greater than distance D2 denoted in FIGS. 16 and 19. Because distance D2 is less than distance D1, the trigger pull travel distance of trigger body 23 and trigger 27 from the set position thereof to the pulled/fired position thereof in the second position of selector 70 corresponding to the assisted reset semi-automatic mode of operation of trigger mechanism 20 is less than the trigger pull travel distance of trigger body 23 and trigger 27 from the set position thereof to the pulled/fired position in the first position of selector 70 corresponding to the semi-automatic mode of operation of trigger mechanism 20, and the trigger reset travel distance of trigger body 23 and trigger 27 from the pulled/fired position thereof to the set position thereof in the second position of selector 70 corresponding to the assisted reset semi-automatic mode of operation of trigger mechanism 20 is less than the trigger rest travel distance of trigger body 23 and trigger 27 from the pulled/fired position thereof to the set position in first position of selector 70 corresponding to the semi-automatic mode of operation of trigger mechanism 20. The lessened trigger pull and trigger reset travel distances of trigger body 23 and trigger 27 in second position of selector 70 corresponding to the assisted-reset mode of operation of trigger mechanism 20 compared to the first position of selector 70 corresponding to the semi-automatic mode of operation

allows for a more rapid repeated pulling and resetting of trigger body 23 and trigger 27 and thus a more rapid rate of repeated semi-automatic fire in the second position of selector 70 than in the first position of selector 70. Also, the lessened trigger reset travel distance in the second position of selector 70 corresponding to the assisted-reset semi-automatic mode of operation of trigger mechanism 20 compared to the first position of selector 70 corresponding to the semi-automatic mode of operation produces less trigger snap of the trigger 27 from the pulled/fired position to the reset position and thus less discomfort on the shooter's trigger finger from prolonged firing activities.

According then to the principle of the invention with reference to FIGS. 17-19, trigger mechanism 20 includes trigger assembly 21 with hammer 40 having trigger notch 49, trigger body 23 with trigger nose 24, trigger tail 25A, and trigger 27, trigger nose 24 for receiving trigger notch 49 in the cocked position of hammer 40 and the set position of trigger body 23 and for releasing trigger nose 24 when trigger body 23 is moved a travel distance from the set position to a fired position, disconnector 30 (shown in FIGS. 1-14), coupled between hammer 40 and trigger body 23, and selector 70 movable between a first position as in FIGS. 17 and 18, which corresponds to the semi-automatic mode of fire or operation, and a second position as in FIGS. 19 and 20, which corresponds to the assisted-reset semi-automatic mode of fire or operation, for adjusting the travel distance of trigger body 23 from the set position to the fired position and from the fired position back to the set position. Selector 70 has stop 78A aligned with notch 25 of tail 25A of trigger body 23 in the first position of selector 70 as in FIGS. 17 and 18, and stop 78B aligned with notch 25 of tail 25A of trigger body 23 in the second position of selector 70 as in FIGS. 19 and 20. Stop 78A is separated from tail 25A, specifically notch 25 of tail

25A, of trigger body 23 distance D1 in the set position of trigger body 23 in the first position of the selector 70 as in FIGS. 17 and 18. Stop 78B is separated from tail 25A, specifically notch 25 of tail 25A, of trigger body 23 distance D2 in the set position of trigger body 23 in the second position of selector 70 as in FIGS. 19 and 20. In the first position of selector 70 and the fired position of trigger body 23 as in FIG. 18, distance D1 of FIG. 17 between stop 78A and tail 25A, specifically notch 25 of tail 25A, of trigger body 23 is closed and tail 25A, specifically notch 25 of tail 25A, contacts stop 78A, and movement of trigger body 23 in a direction from the set position to the fired position is arrested by tail 25A, specifically notch 25 of tail 25A, contacting stop 78A. In the second position of selector 70 and the fired position of trigger body 23 as in FIG. 20, distance D2 between stop 78B and tail 25A, specifically notch 25 of tail 25A, of trigger body 23 is closed and tail 25A, specifically notch 25 of tail 25A, contacts stop 78B, and movement of trigger body 23 is arrested by tail 25A, specifically notch 25 of tail 25A, contacting stop 78B. Distance D2 is less than distance D1, wherein the travel distance of trigger body 23 in the second position of selector 70 as in FIGS. 19 and 20 is less than the travel distance of trigger body 23 in the first position of selector 70 as in FIGS. 17 and 18.

The present invention is described above with reference to preferred embodiments. However, those skilled in the art will recognize that changes and modifications may be made in the described embodiments without departing from the nature and scope of the present invention. Various further changes and modifications to the embodiments herein chosen for purposes of illustration will readily occur to those skilled in the art. To the extent that such modifications and variations do not depart from the spirit of the invention, they are intended to be included within the scope thereof.

Having fully described the invention in such clear and concise terms as to enable those skilled in the art to understand and practice the same, the invention claimed is:

CLAIMS

1. A trigger mechanism, comprising:

a trigger disconnector assembly having a trigger nose, and a disconnector having a disconnector hook;

a reset lever mounted for pivotal movement between open and closed positions;

the trigger disconnector assembly mounted for pivotal movement between charged and discharged orientations, the charged orientation comprises a set position of the trigger nose and a disengaged position of the disconnector hook, and the discharged orientation comprises a released position of the trigger nose and an engaged position of the disconnector hook;

a hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer; and

the trigger disconnector assembly is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the trigger disconnector assembly to pivot the trigger disconnector assembly from the discharged orientation to the charged orientation when the reset lever moves from the open position to the closed position, to position the trigger nose in the set position in preparation to be received by the trigger notch in the cocked position of the

hammer and to position the disconnector in the disengaged position of the disconnector hook relative to the hammer disconnect notch.

2. The trigger mechanism according to claim 3, further comprising a spring that keeps tension on the reset lever urging the reset lever toward the closed position.

3. The trigger mechanism according to claim 2, wherein the reset lever isolates the hammer from the trigger disconnector assembly, preventing the hammer from striking the trigger disconnector assembly in the past cocked position of the hammer.

4. A trigger mechanism, comprising:

a trigger disconnector assembly having a trigger nose, and a disconnector having a disconnector hook and a cam surface;

a reset lever mounted for pivotal movement between open and closed positions;

the trigger disconnector assembly mounted for pivotal movement between charged and discharged orientations, the charged orientation comprises a set position of the trigger nose and a disengaged position of the disconnector hook, and the discharged orientation comprises a released position of the trigger nose and an engaged position of the disconnector hook;

a hammer includes a striking end including a striking surface and an opposed hammer tail, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a forward position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the set position of the trigger nose and the cocked position of the hammer; and

the cam surface of the trigger disconnector assembly is in mechanical communication with the reset lever, the hammer tail of the striking end of the hammer strikes the reset lever in the past-cocked position the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the cam surface to pivot the trigger disconnector assembly from the discharged orientation to the charged orientation when the reset lever moves from the open position to the closed position, to position the trigger nose in the set position in preparation to be received by the trigger notch in the cocked position of the hammer and to position the disconnector in the

disengaged position of the disconnector hook relative to the hammer disconnect notch.

5. The trigger mechanism according to claim 4, a spring that keeps tension on the reset lever urging the reset lever toward the closed position.

6. The trigger mechanism according to claim 5, wherein the reset lever isolates the hammer from the trigger disconnector assembly, preventing the hammer from striking the trigger disconnector assembly in the past cocked position of the hammer.

7. The trigger mechanism according to claim 6, wherein the hammer tail of the hammer strikes the reset lever in the past-cocked position of the hammer at a location between the cam surface and the disconnector hook.

8. A trigger mechanism, comprising:

a trigger body having a trigger nose and a trigger pivot for pivotally coupling the trigger body to a firearm for movement of the trigger nose between set and released positions;

a reset lever mounted for pivotal movement between open and closed positions;

a disconnector having a disconnector hook, and a disconnector pivot pivotally coupling the disconnector to the trigger pivot for movement of the disconnector hook between disengaged and engaged positions in response to pivotal movement of the trigger body between the set and released positions of the trigger nose, respectively;

a hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer; and

the disconnector is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the disconnector to concurrently pivot the disconnector from the engaged position of the disconnector hook to the disengaged position of the disconnector hook and the trigger body from the released position of the trigger nose to the set position of the trigger nose in preparation to be received by the trigger notch in the cocked position of the hammer when the reset lever moves from the open position to the closed position.

9. The trigger mechanism according to claim 8, a spring that keeps tension on the reset lever urging the reset lever toward the closed position.

10. The trigger mechanism according to claim 9, wherein the reset lever isolates the hammer from the trigger body and the disconnector, preventing the hammer from striking the trigger body and the disconnector in the past cocked position of the hammer.

11. A trigger mechanism, comprising:

a trigger body having a trigger nose and a trigger pivot for pivotally coupling the trigger body to a firearm for movement of the trigger nose between set and released positions;

a reset lever mounted for pivotal movement between open and closed positions;

a disconnector having a disconnector lever, a disconnector hook, and a disconnector pivot pivotally coupling the disconnector to the trigger pivot for movement of the disconnector hook between disengaged and engaged positions in response to pivotal movement of the trigger body between the set and released positions of the trigger nose, respectively;

a hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer; and

the disconnector lever of the disconnector is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the disconnector lever to concurrently pivot the disconnector from the engaged position of the disconnector hook to the disengaged position of the disconnector hook and the trigger body from the released position of the trigger nose to the set position of the trigger nose in preparation to be received by the trigger notch in the cocked position of the hammer when the reset lever moves from the

open position to the closed position.

12. The trigger mechanism according to claim 11, a spring that keeps tension on the reset lever urging the reset lever toward the closed position.

13. The trigger mechanism according to claim 12, wherein the reset lever isolates the hammer from the trigger body and the disconnector, preventing the hammer from striking the trigger body and the disconnector in the past cocked position of the hammer.

14. The trigger mechanism according to claim 6, wherein the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer at a location between the disconnector lever and the disconnector hook.

15. A trigger mechanism, comprising:

a trigger body having a trigger nose and a trigger pivot for pivotally coupling the trigger body to a firearm for movement of the trigger nose between set and released positions;

a reset lever mounted for pivotal movement between open and closed positions;

a disconnector having a disconnector hook, a cam surface, and a disconnector pivot pivotally coupling the disconnector to the trigger pivot for movement of the disconnector hook between disengaged and engaged positions in response to pivotal movement of the trigger body between the set and released positions of the trigger nose, respectively;

a hammer includes a striking end, a hammer disconnect notch, a pivot end pivotable about a hammer pivot between a firing position of the striking end, a cocked position of the striking end, and a past-cocked position of the striking end, and a trigger notch formed in the pivot end for receiving the trigger nose in the cocked position of the hammer; and

the cam surface of the disconnector is in mechanical communication with the reset lever, the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer pivoting the reset lever from the open position to the closed position, the reset lever acting on the cam surface to concurrently pivot the disconnector from the engaged position of the disconnector hook to the disengaged position of the disconnector hook and the trigger body from the released position of the trigger nose to the set position of the trigger nose in preparation to be received by the trigger notch in the cocked position of the hammer when the reset lever moves from the open position to the

closed position.

16. The trigger mechanism according to claim 15, a spring that keeps tension on the reset lever urging the reset lever toward the closed position.

17. The trigger mechanism according to claim 16, wherein the reset lever isolates the hammer from the trigger body and the disconnector, preventing the hammer from striking the trigger body and the disconnector in the past cocked position of the hammer.

18. The trigger mechanism according to claim 6, wherein the striking end of the hammer strikes the reset lever in the past-cocked position of the hammer at a location between the cam surface and the disconnector hook.

19. A trigger mechanism, comprising:

a trigger assembly with a hammer having a trigger notch, a trigger body has a trigger nose, a trigger tail, and a trigger, the trigger nose for receiving the trigger notch in a cocked position of the hammer and a set position of the trigger body and for releasing the trigger nose when the trigger body is moved a travel distance from the set position to a fired position, a disconnector coupled between the hammer and the trigger body, and a selector movable between a first position and a second position for adjusting the travel distance of the trigger body;

the selector has a first stop aligned with the tail of the trigger body in the first position, and a second stop aligned with the tail of the trigger body in the second position;

the first stop is separated from tail of the trigger body a first distance in the set position of the trigger body in the first position of the selector, and the second stop is separated from tail of the trigger body a second distance in the set position of the trigger body in the second position of the selector;

in the first position of the selector and the fired position of the trigger body the first distance between the first stop and the tail of the trigger body is closed and the tail contacts the first stop, and movement of the trigger body is arrested by the tail contacting the first stop;

in the second position of the selector and the fired position of the trigger body the second distance between the second stop and the tail of the trigger body is closed and the tail contacts the second stop, and movement of the trigger body is arrested by the tail contacting the second stop; and

the second distance is less than the first distance, wherein the travel distance of the trigger body in the second position of the selector is less than the travel distance of the trigger body in the first position of the selector.

A TRIGGER MECHANISM

ABSTRACT

A trigger mechanism includes a hammer, and a trigger disconnector assembly including a trigger body having a trigger nose, and a disconnector having a disconnector hook. A reset lever is mounted for movement between open and closed positions. The trigger disconnector assembly is in mechanical communication with the reset lever. A striking end of the hammer strikes the reset lever in a past-cocked position of the hammer moving the reset lever from the open position to the closed position, the reset lever acting on the trigger disconnector assembly to reset the trigger body and the disconnector in the past-cocked position of the hammer in preparation for securing the hammer in a cocked position preparatory to firing by another trigger pull of the trigger body.

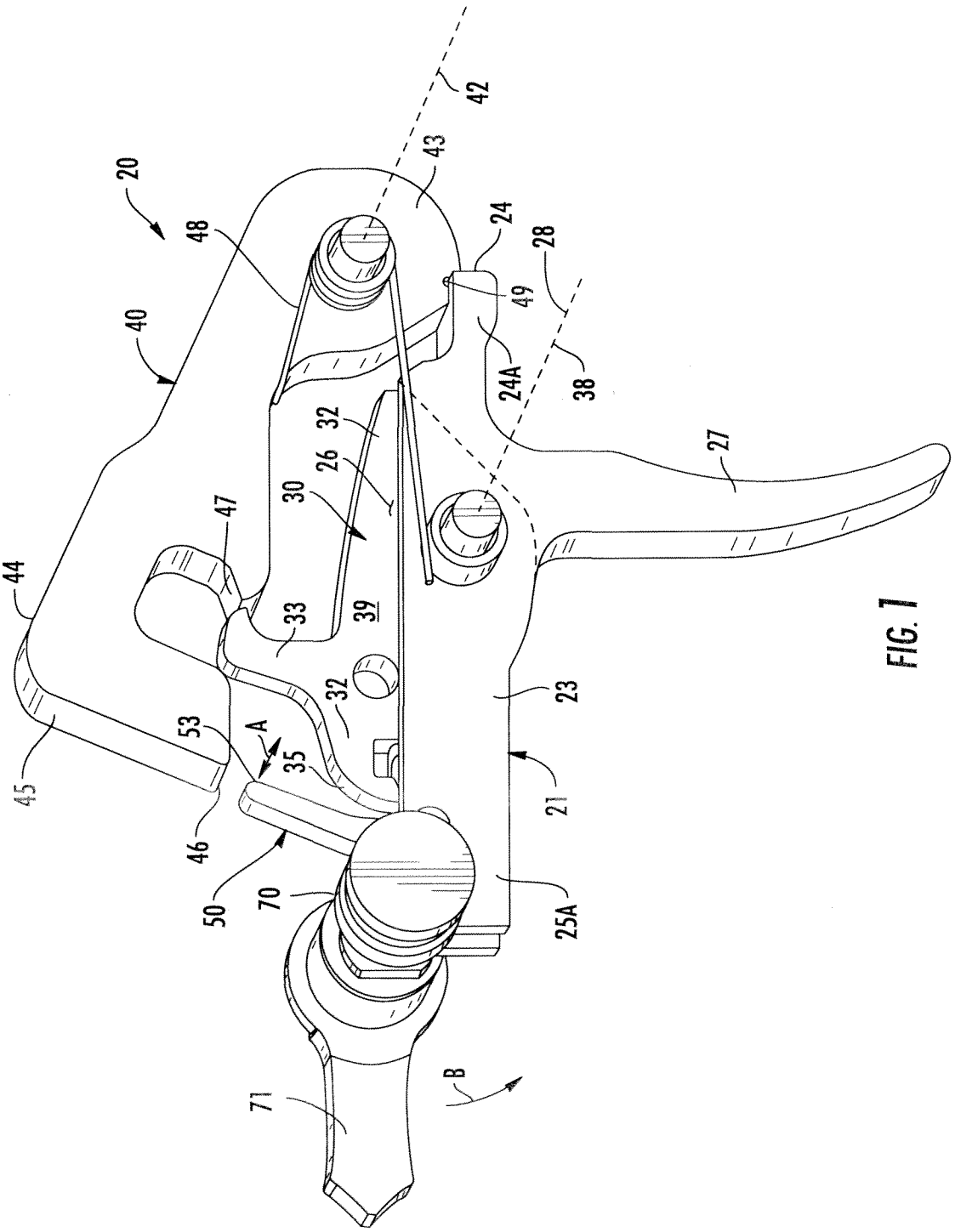

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FIG. 1

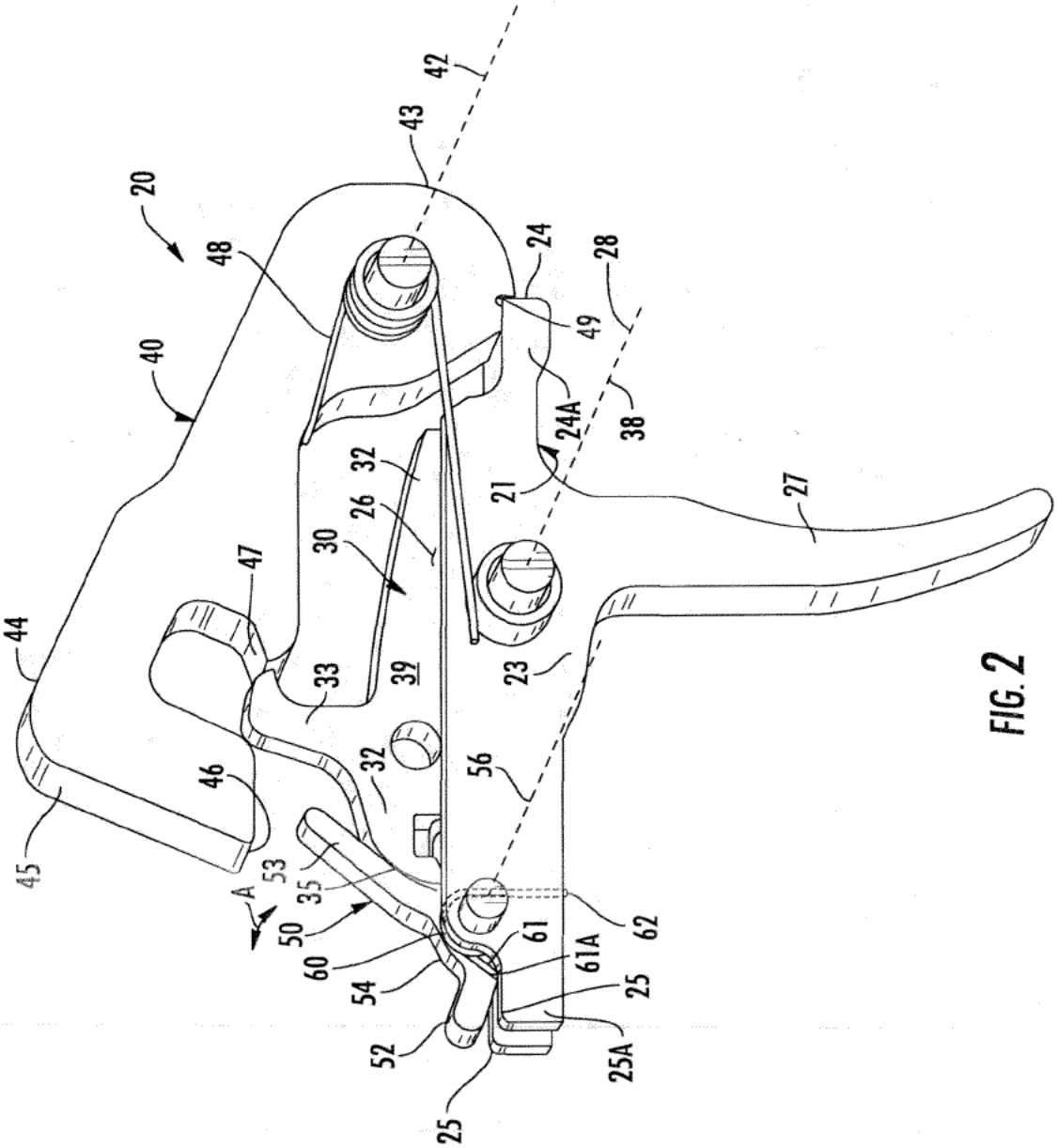
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FIG. 2

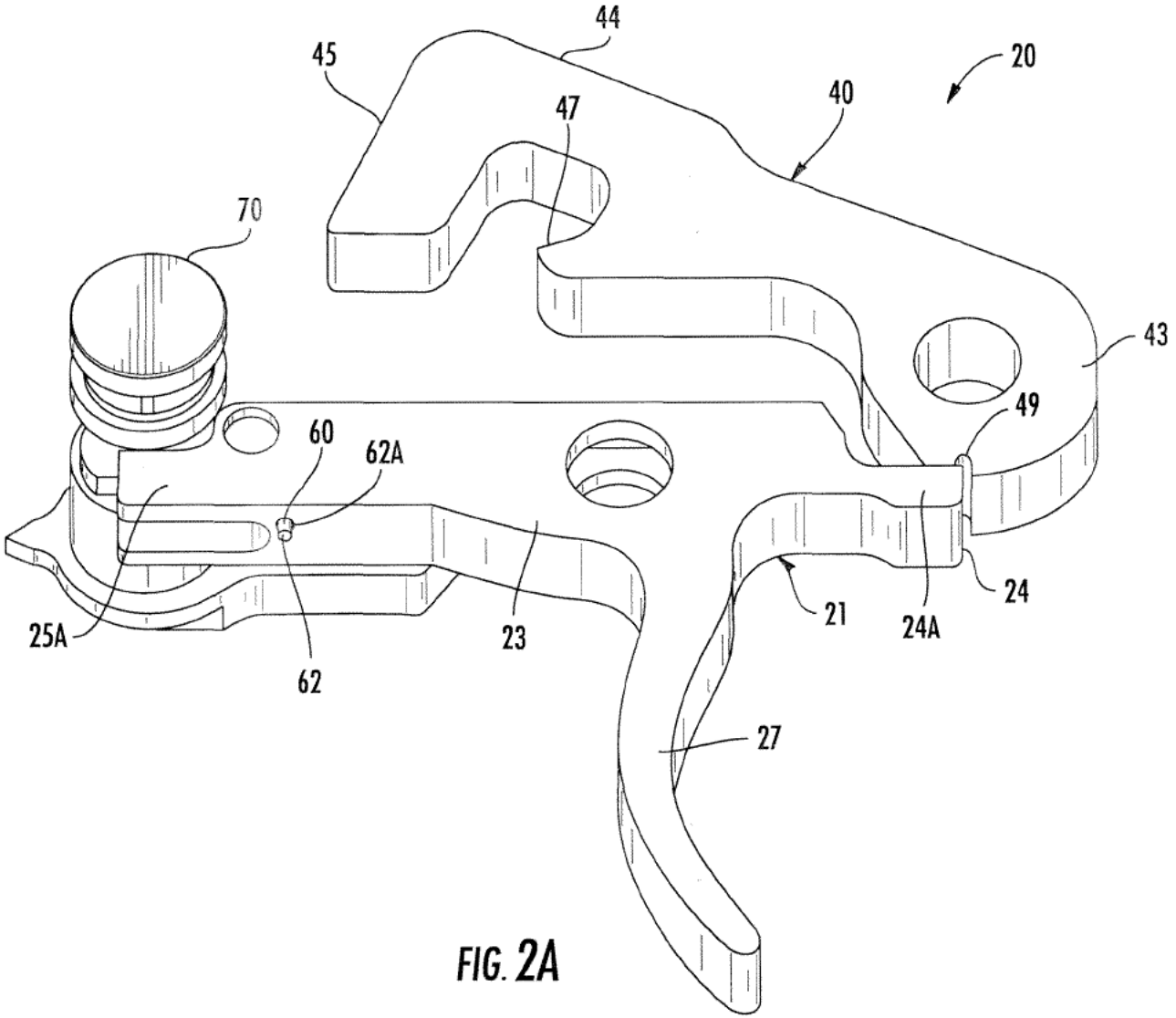

FIG. 2A

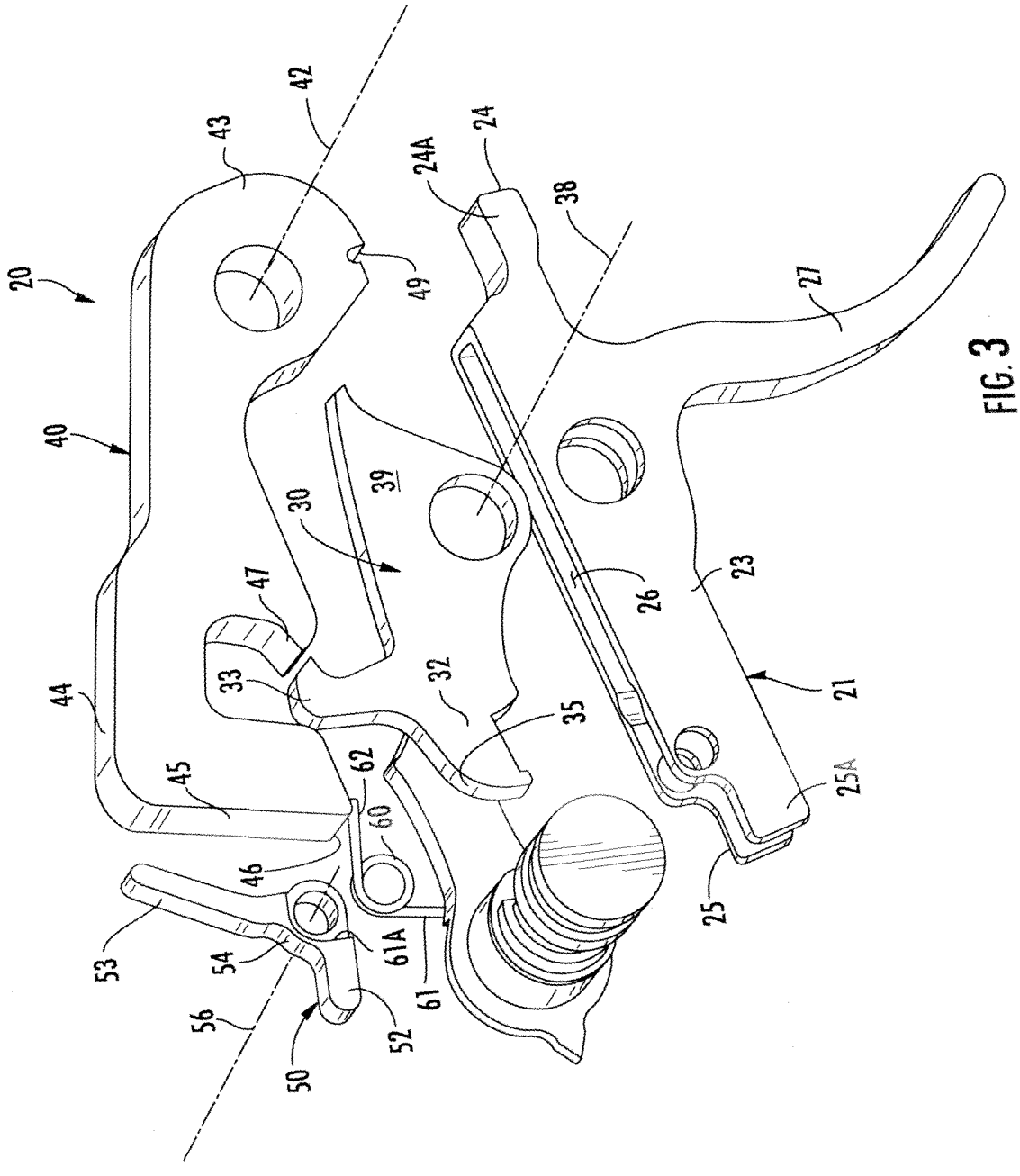
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FIG. 3

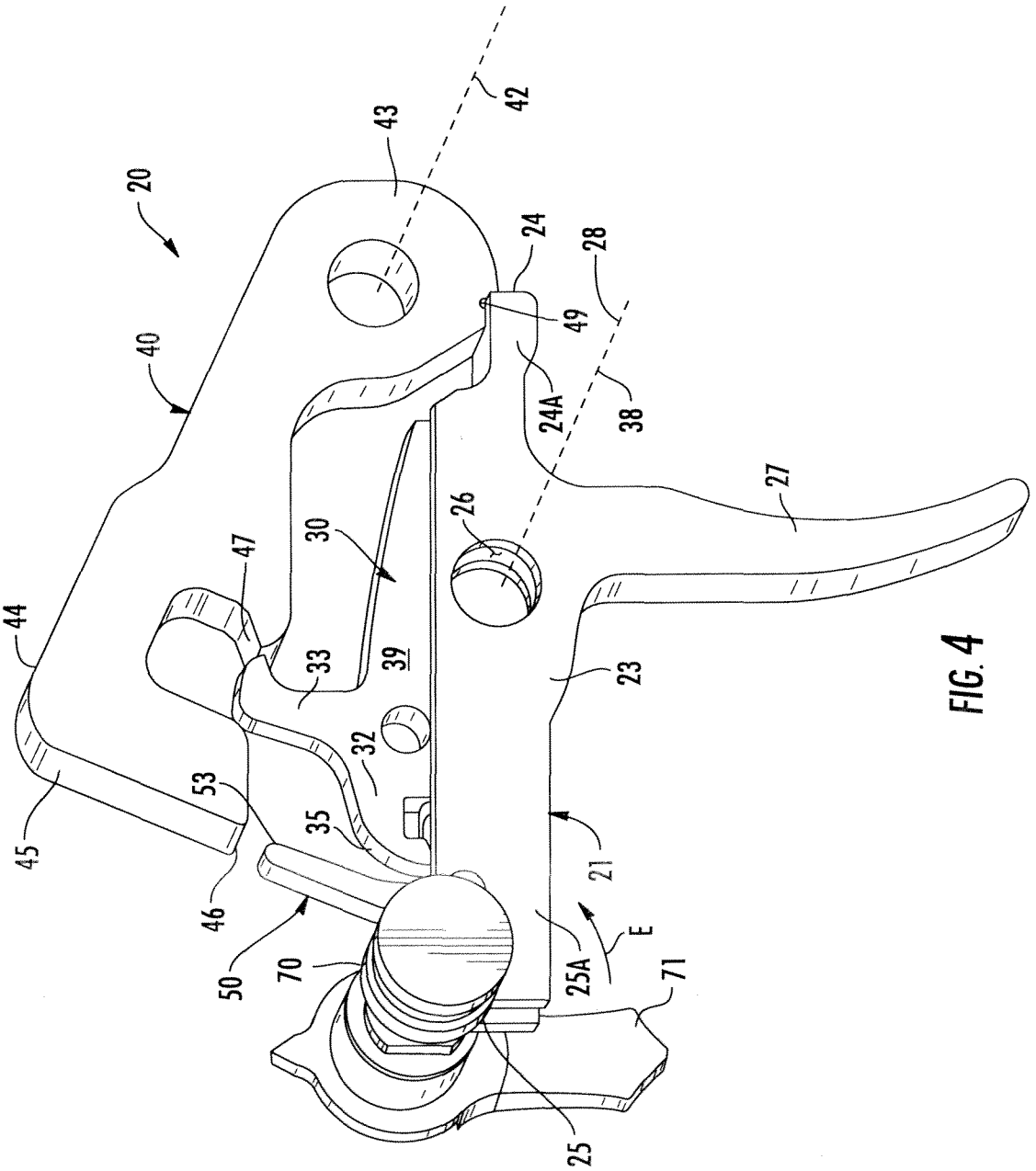
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FIG. 4

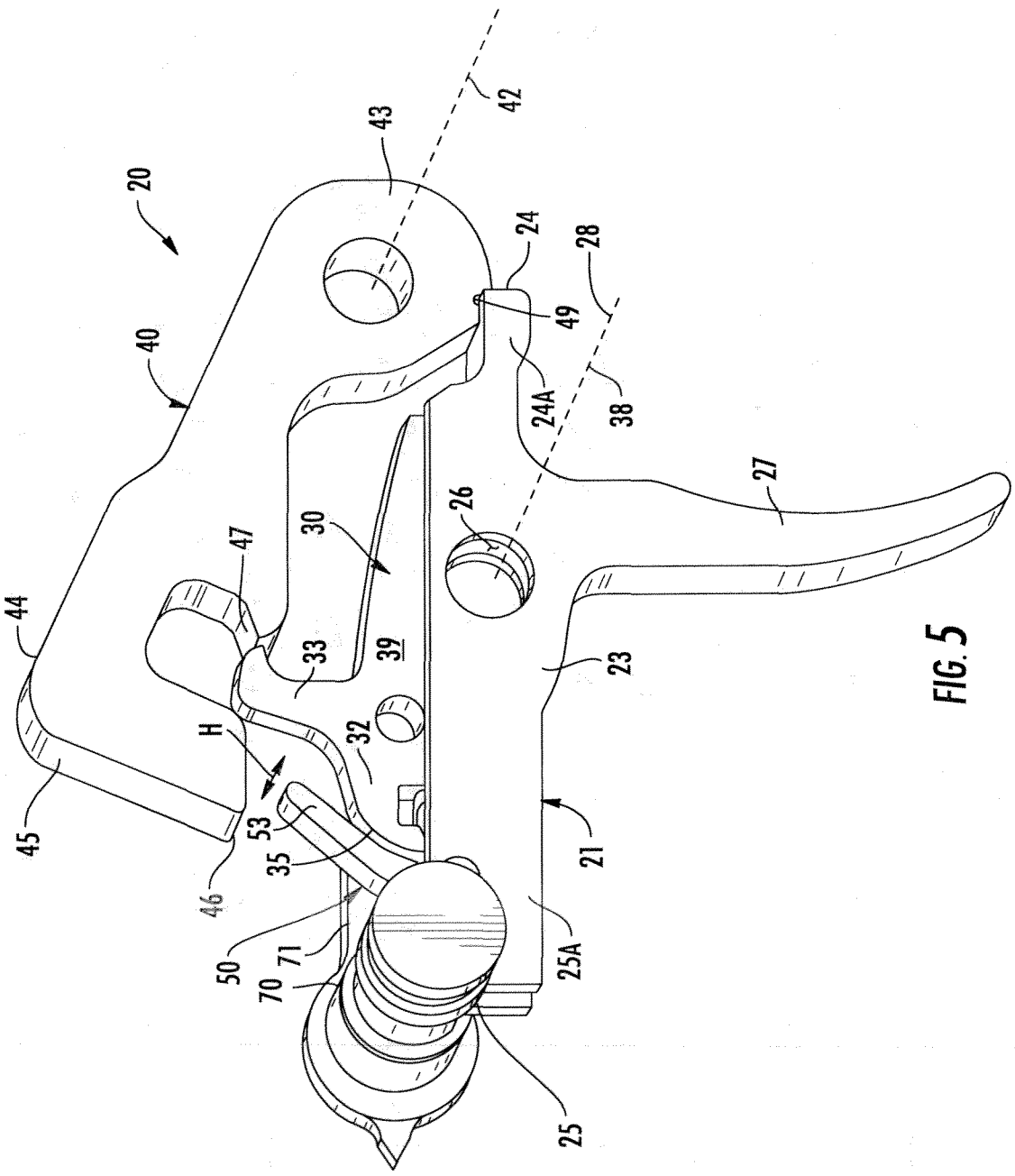
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FIG. 5

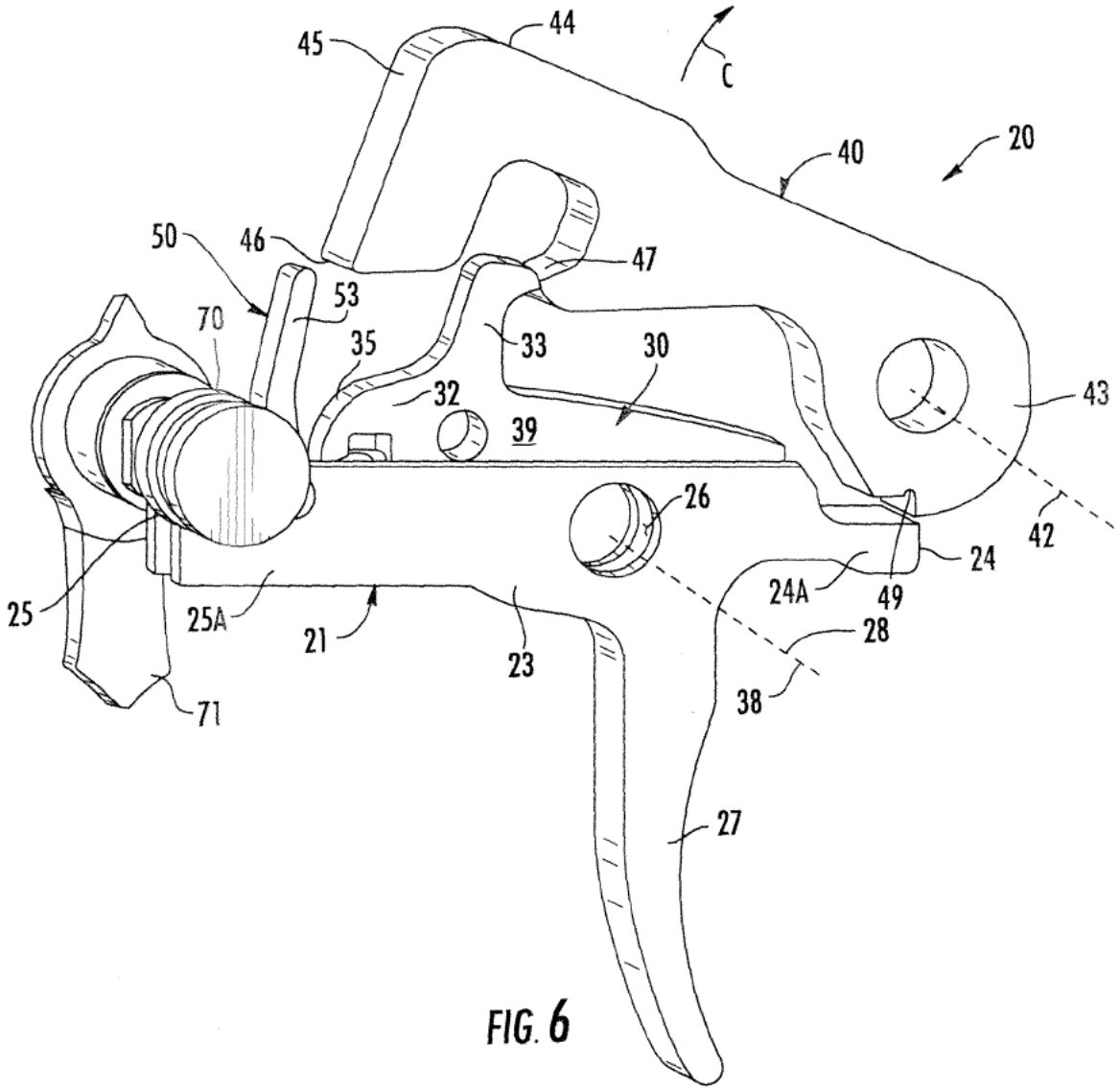
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FIG. 6

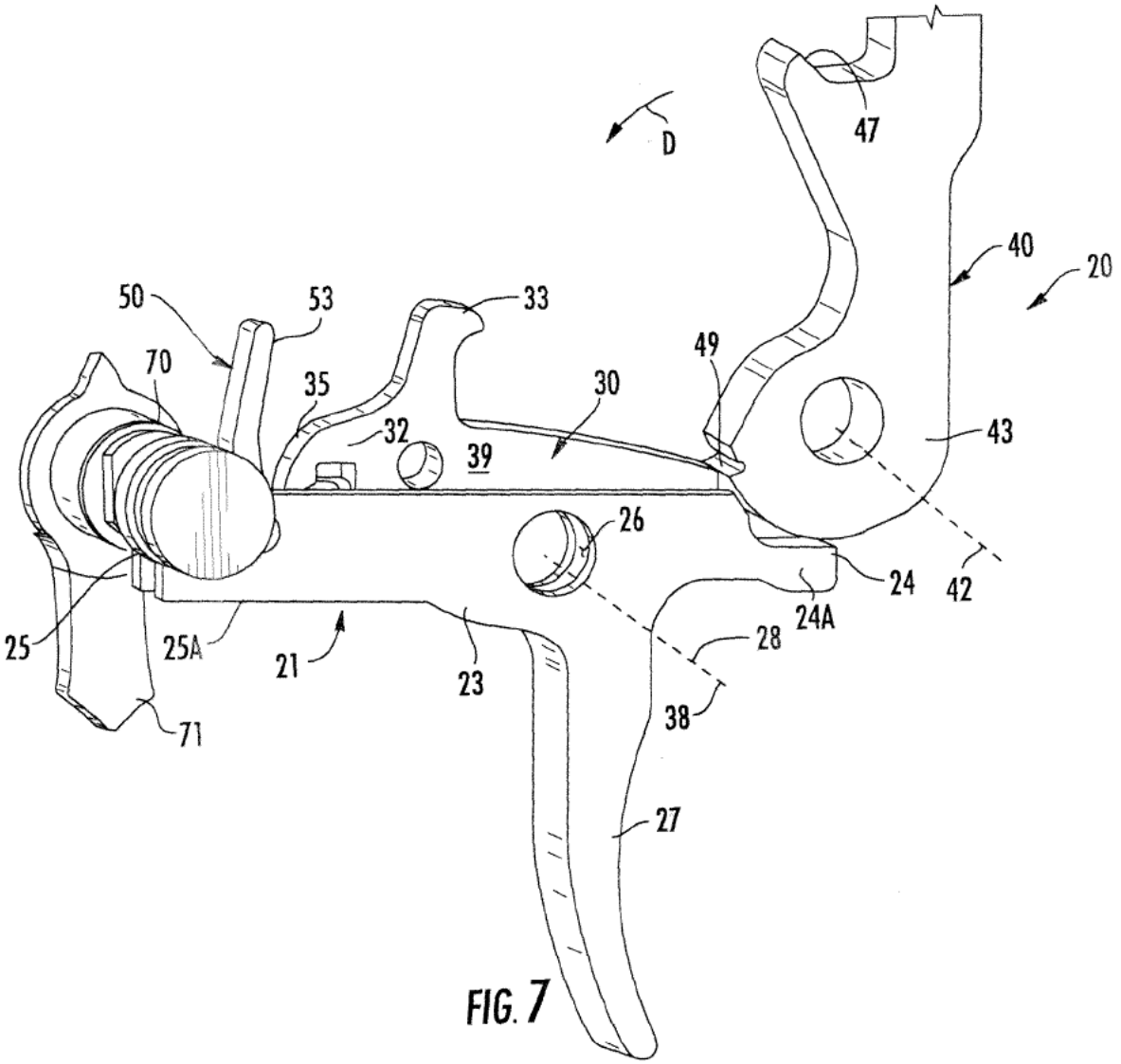
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FIG. 7

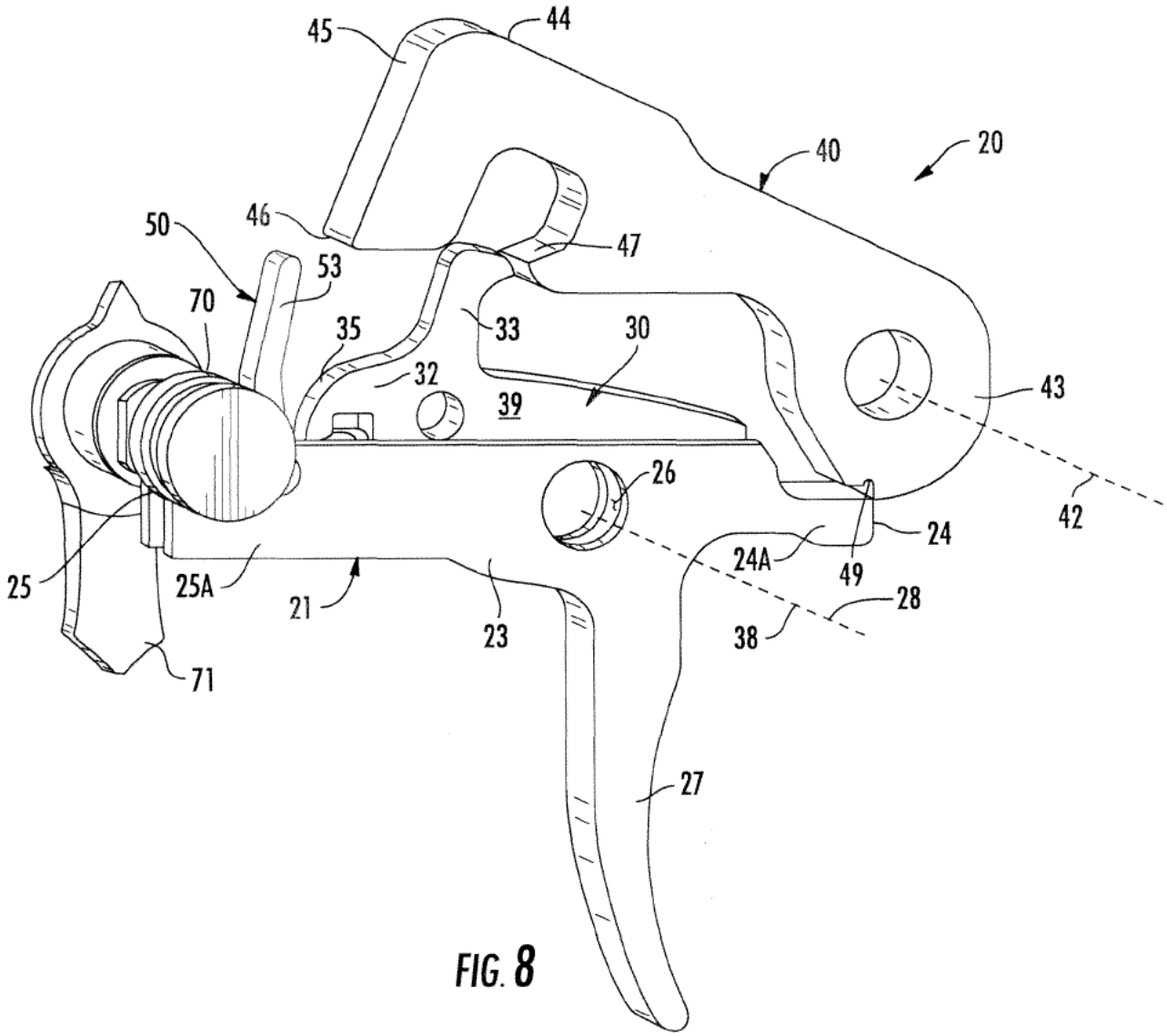
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FIG. 8

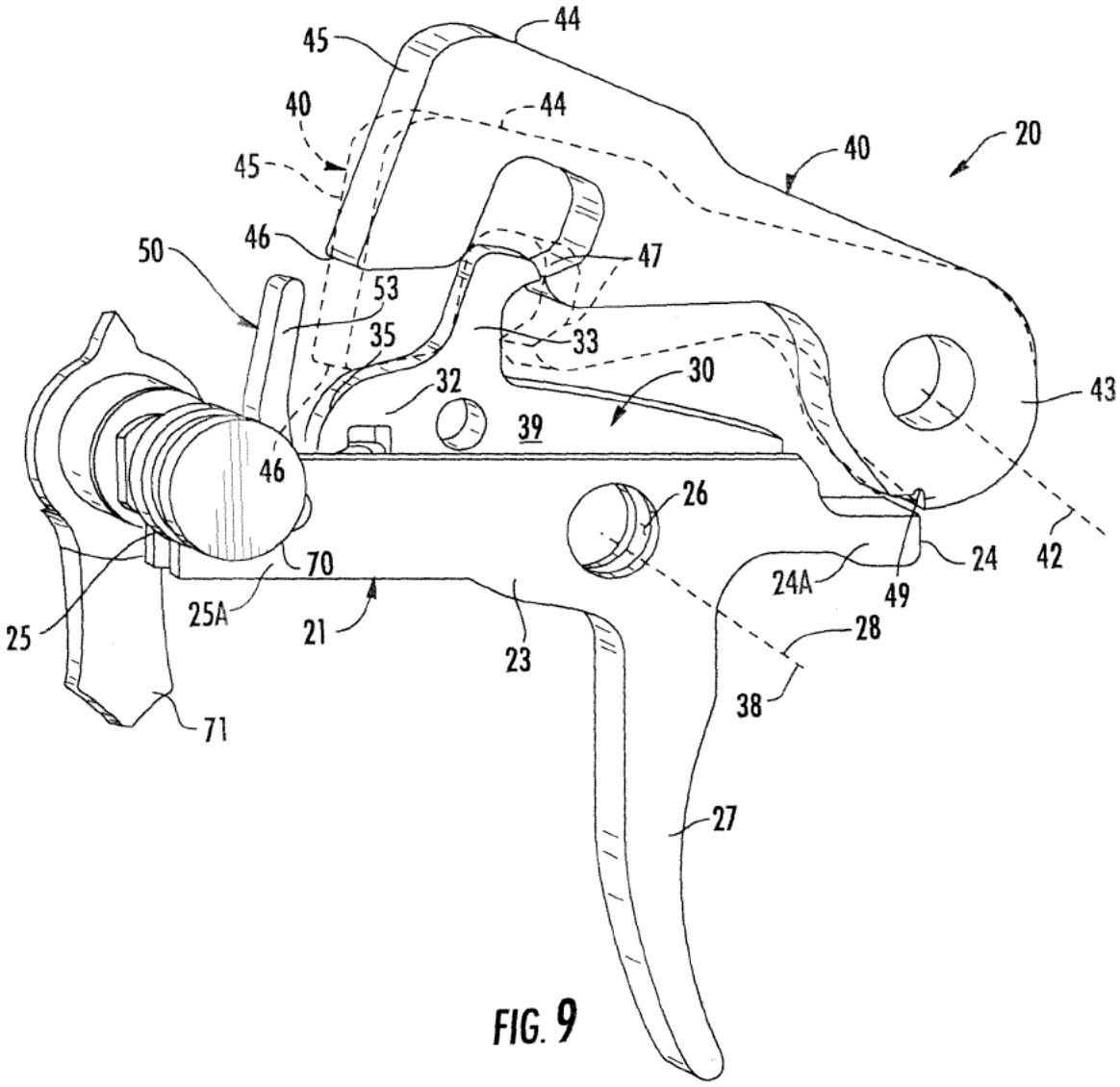
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FIG. 9

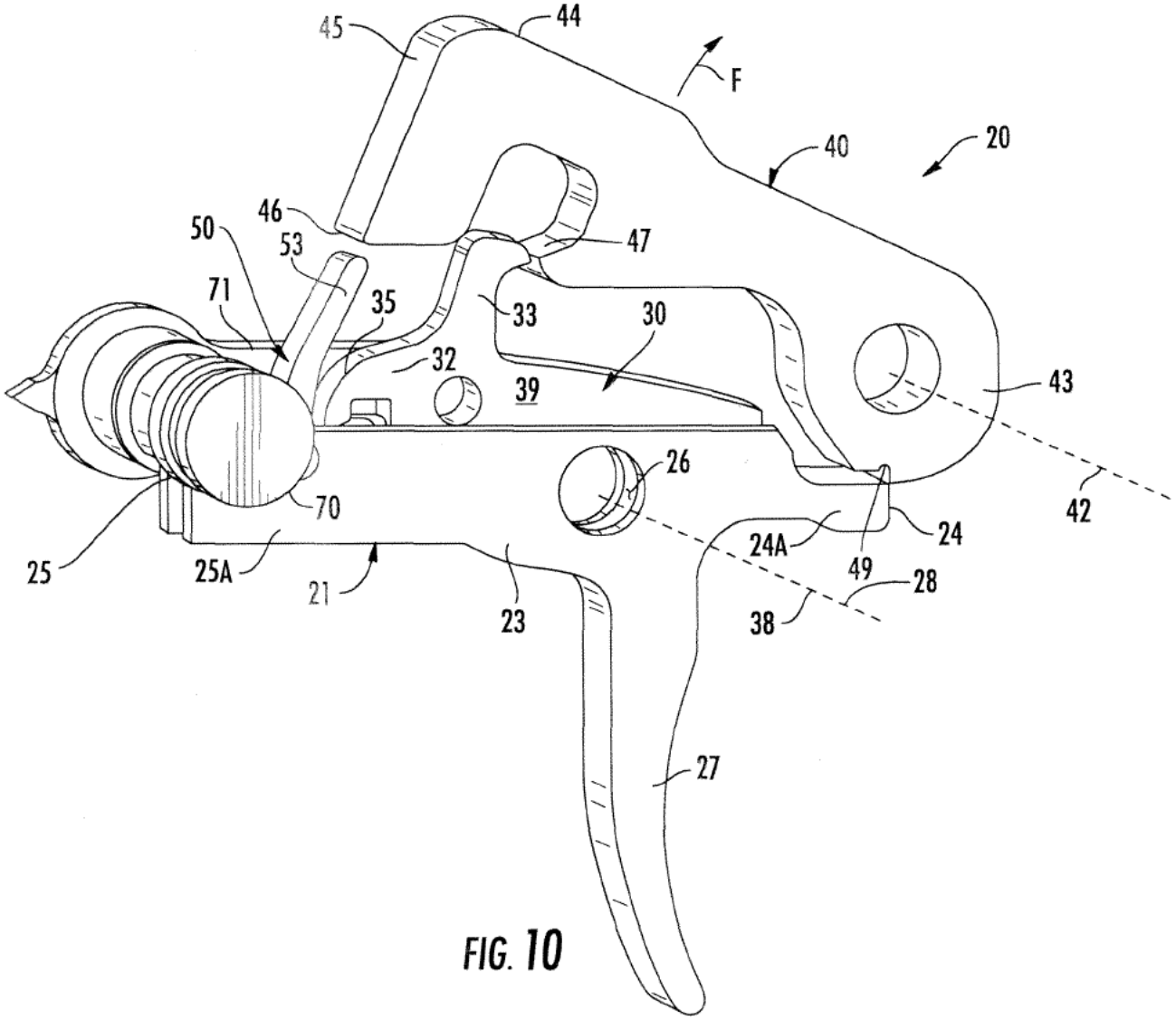
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FIG. 10

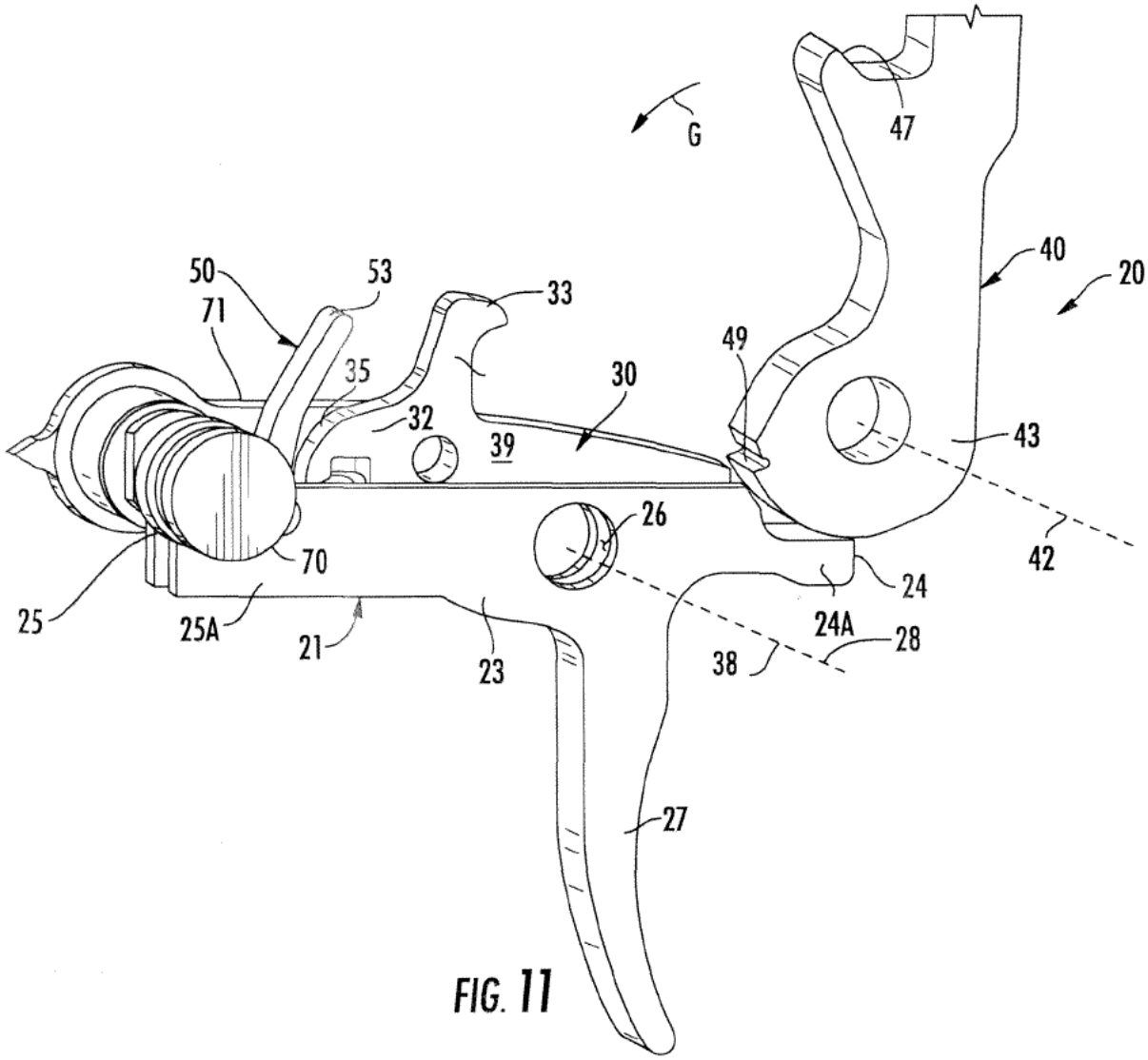
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FIG. 11

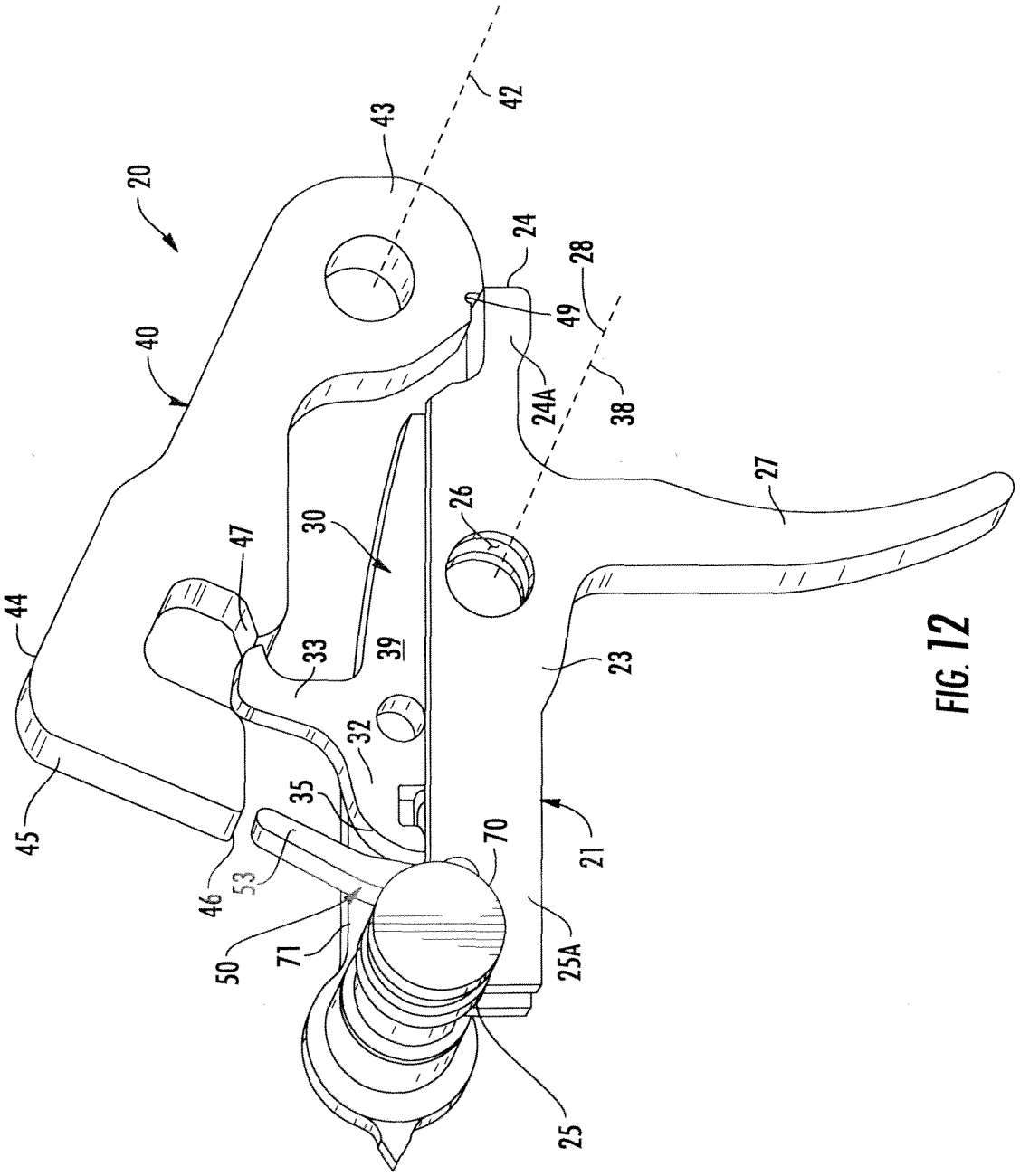
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FIG. 12

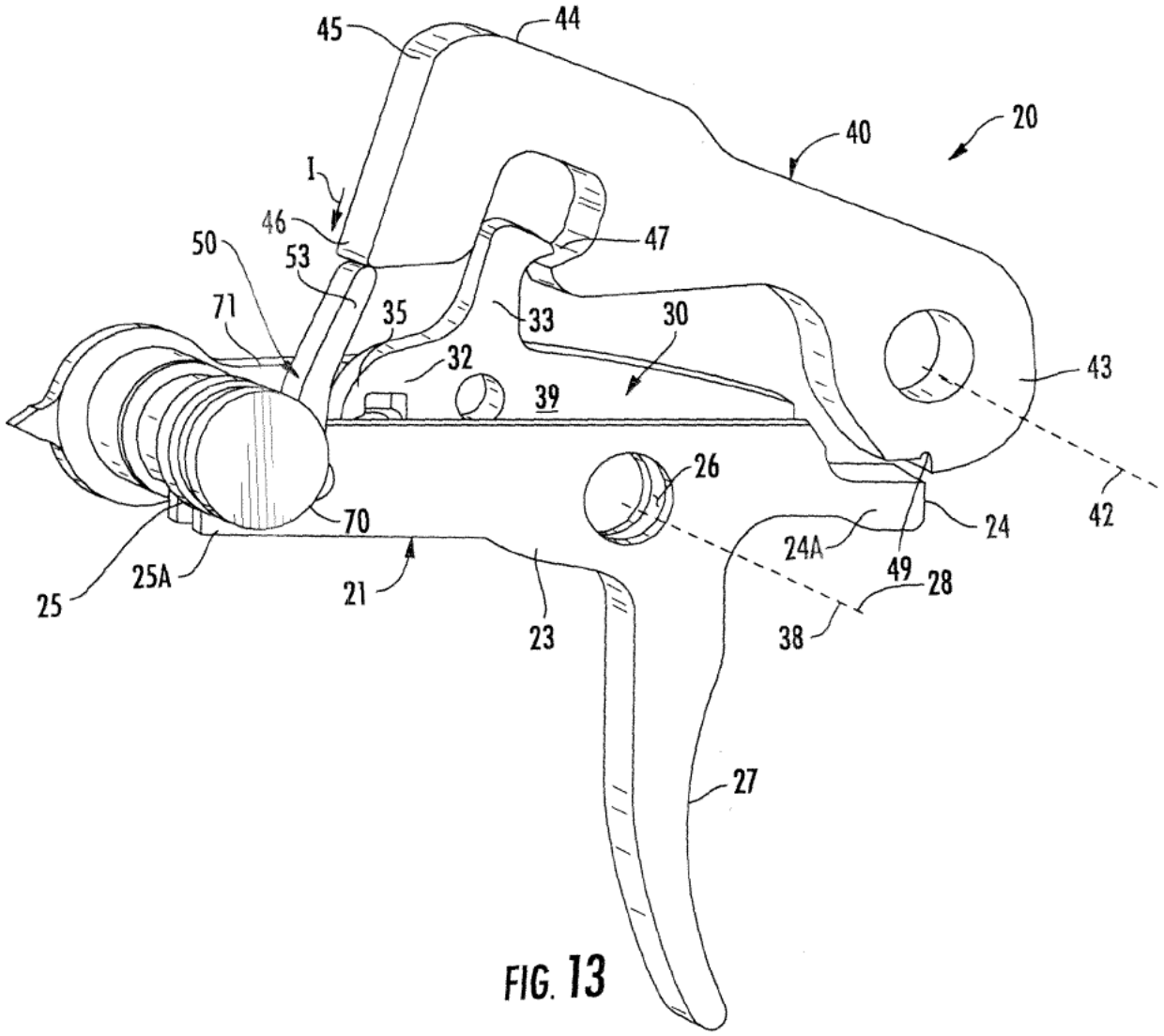
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FIG. 13

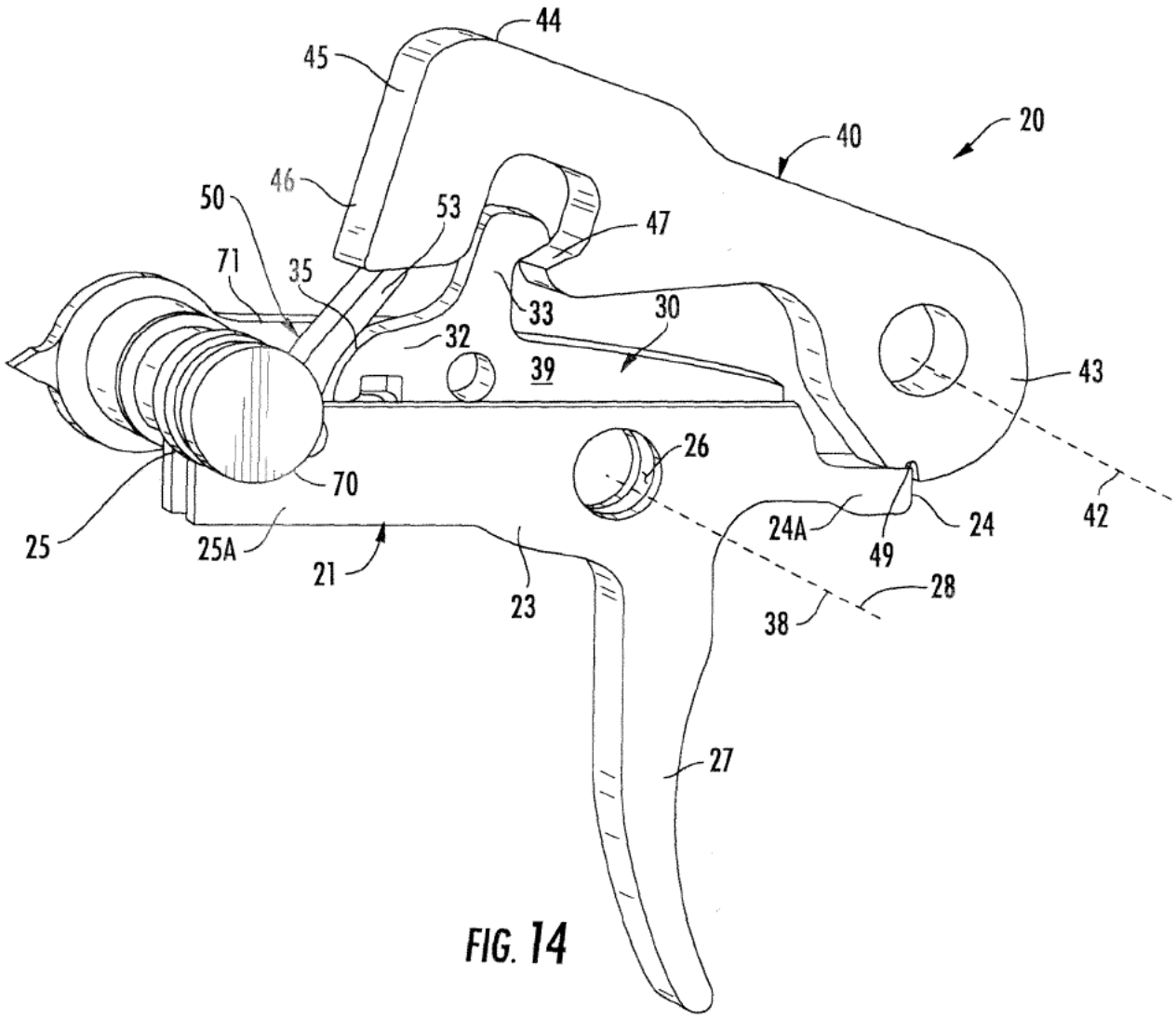
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FIG. 14

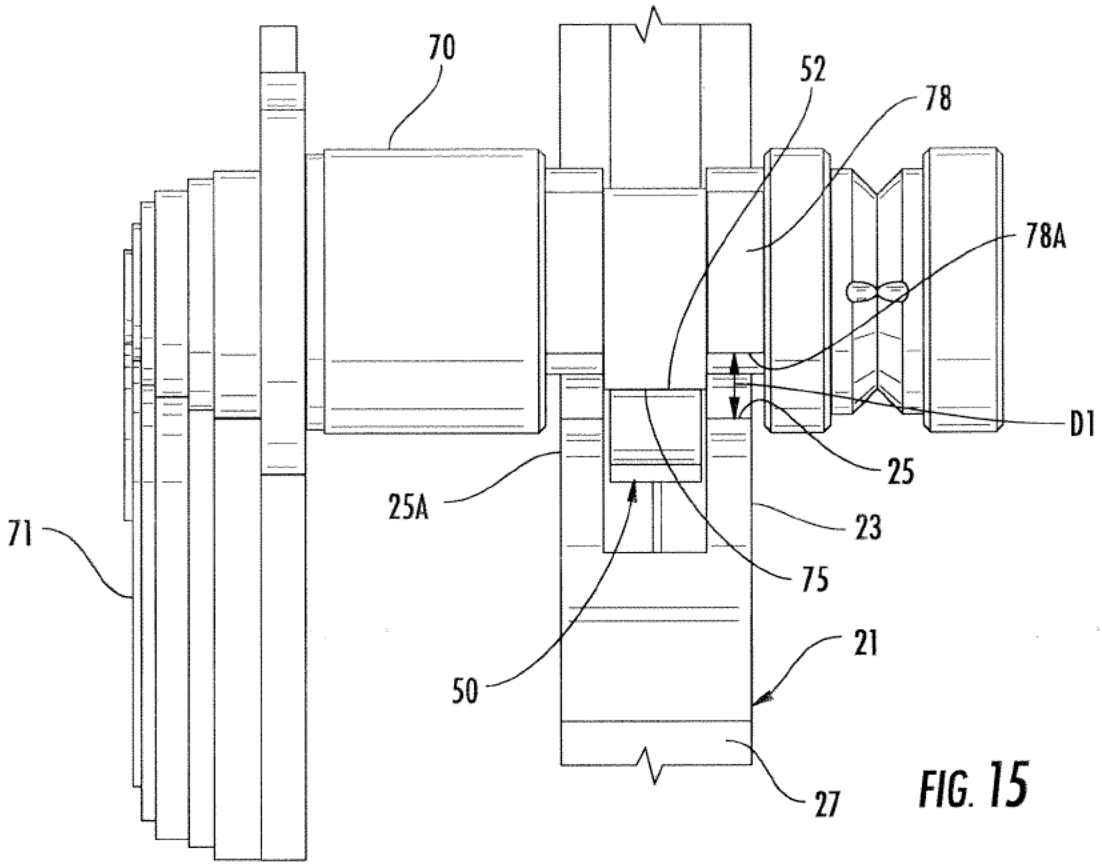
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FIG. 15

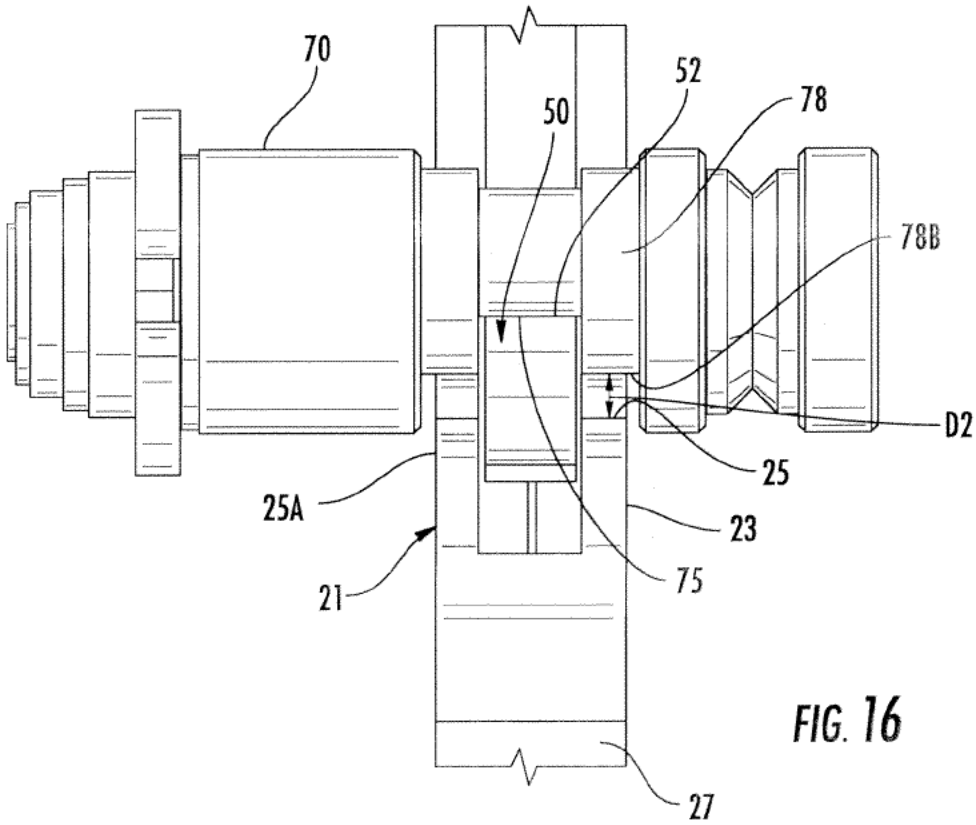
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FIG. 16

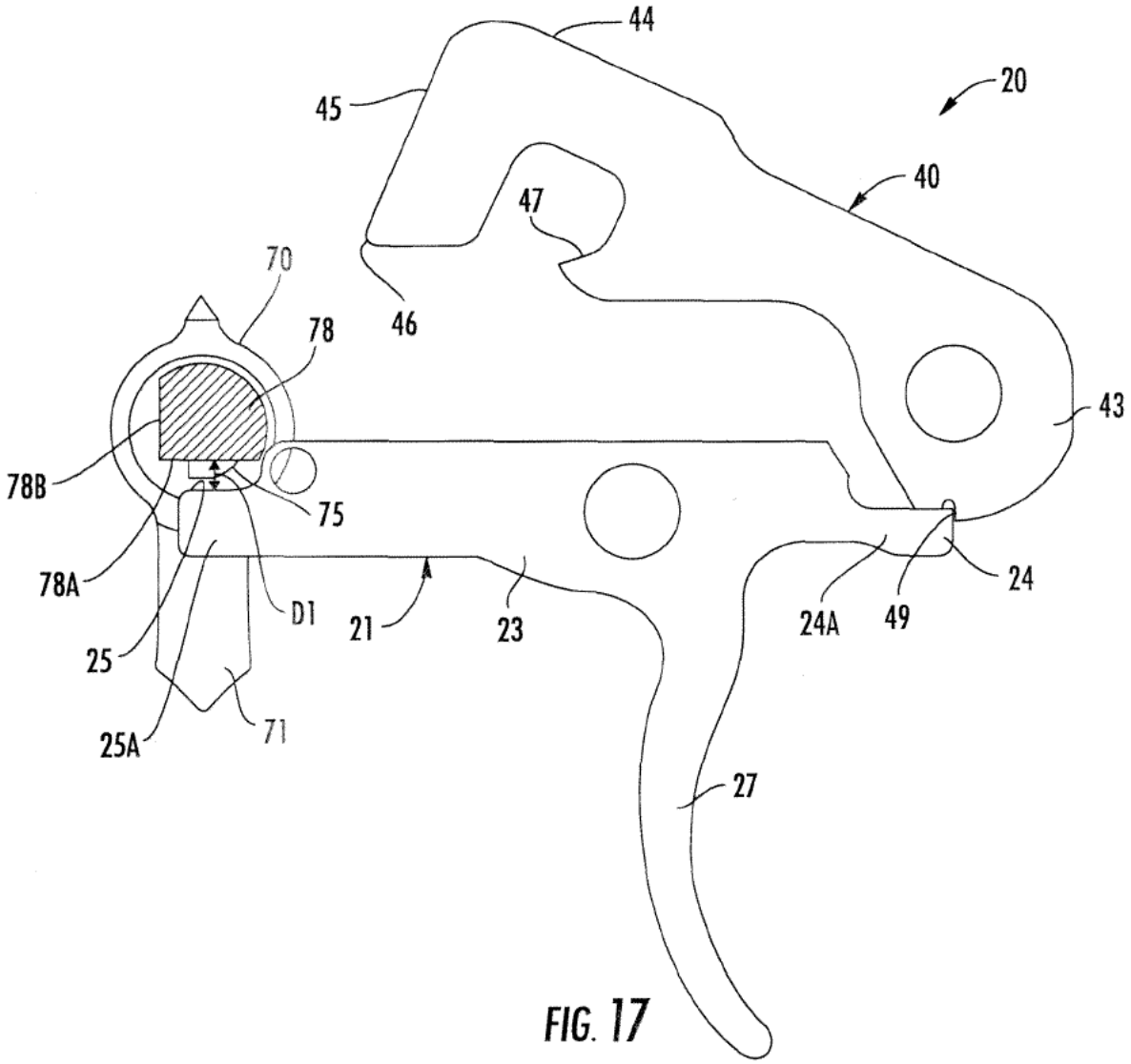


FIG. 17

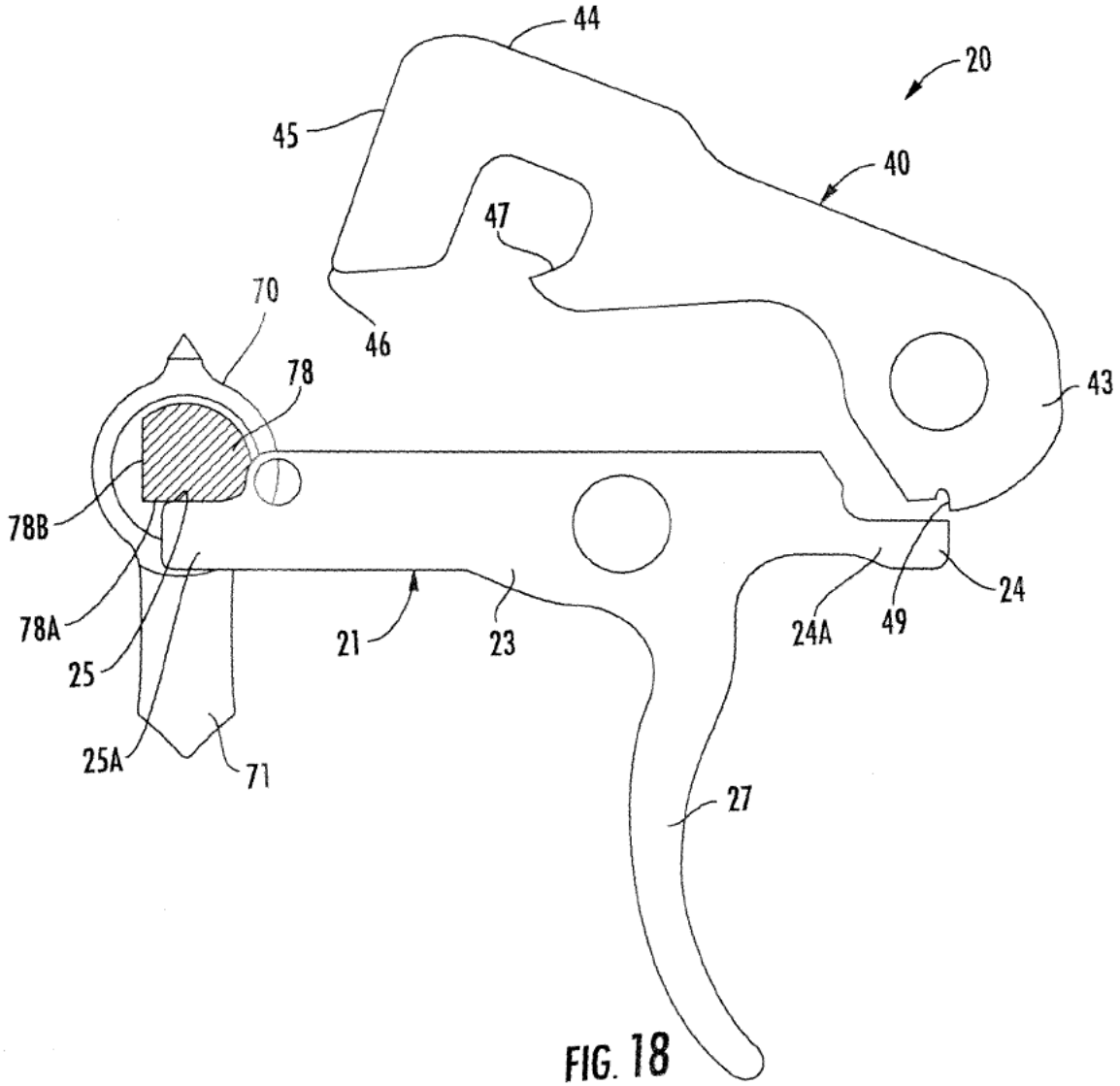


FIG. 18

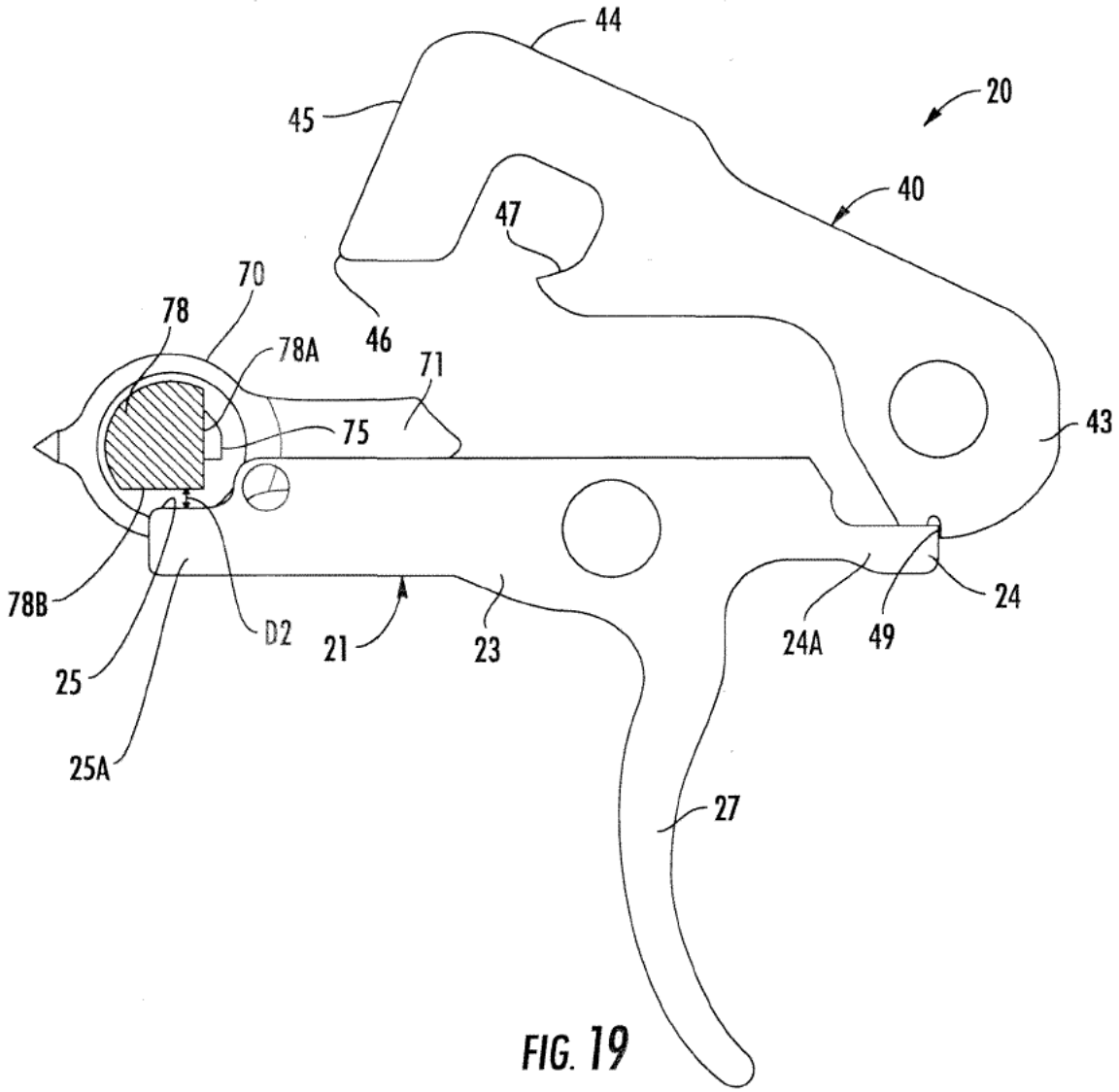


FIG. 19

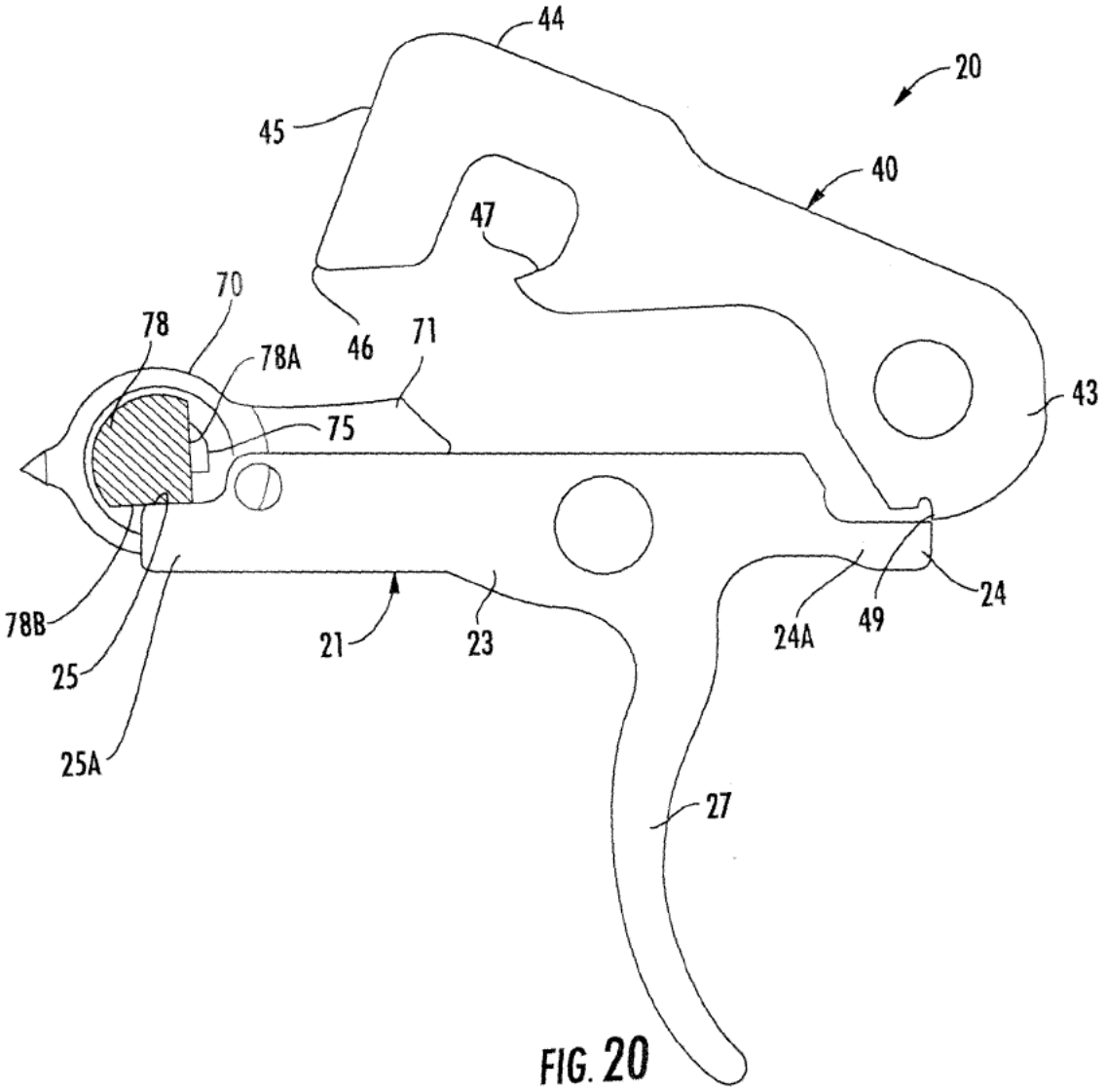


FIG. 20

545071488457

Ship (P/U) date
Thur 10/31/2013 3:08 pm
Martinsburg, WV US

Delivered
Signature not required

Actual delivery
Fri 11/01/2013 2:47 pm
NEW RIVER, AZ US

Travel History

Date/Time	Activity	Location
- 11/01/2013 - Friday		
2:47 pm	Delivered Left at front door. Package delivered to recipient address - release authorized	NEW RIVER, AZ
7:37 am	On FedEx vehicle for delivery	PHOENIX, AZ
7:28 am	At local FedEx facility	PHOENIX, AZ
5:10 am	At destination sort facility	PHOENIX, AZ
4:59 am	Departed FedEx location	INDIANAPOLIS, IN
12:30 am	Arrived at FedEx location	INDIANAPOLIS, IN
- 10/31/2013 - Thursday		
7:09 pm	Left FedEx origin facility	HAGERSTOWN, MD
2:58 pm	Shipment information sent to FedEx	
3:08 pm	Picked up	HAGERSTOWN, MD

Local Scan Time

EVAL-
301-071-MPC

Shipment Facts

Tracking number	545071488457	**Service**	FedEx Priority Overnight
Weight	1 lbs	**Delivered To**	Residence
Total pieces	1	**Total shipment weight**	1 lbs / 0.5 kgs
Shipper reference	Eval 301071		
Special handling section	Deliver Weekday, Residential Delivery	**Packaging**	Your Packaging

U.S. Department of Justice

Bureau of Alcohol, Tobacco,
Firearms and Explosives

Martinsburg, WV 25405

www.atf.gov

AUG 2 8 2018

907010: RKD
3311/307385

[redacted]
Buda, Texas 78610

Dear Sir,

This is in reference to your submission and accompanying correspondence to, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), Firearms Technology Industry Services Branch (FTISB), accompanied by an AR-15 type rifle equipped with what is described as the [redacted] AR1 trigger system (see enclosed photos). Specifically, you requested an examination and classification of this sample with regard to the amended Gun Control Act of 1968 (GCA) and the National Firearms Act (NFA).

As you know, the National Firearms Act (NFA), 26 U.S.C. § 5845(b), defines the term "**machinegun**" as—

...any weapon which shoots, is designed to shoot, or can be readily restored to shoot, automatically more than one shot, without manual reloading, by a single function of the trigger. The term shall also include the frame or receiver of any such weapon, any part designed and intended solely and exclusively, or combination of parts designed and intended, for use in converting a weapon into a machinegun, and any combination of parts from which a machinegun can be assembled if such parts are in the possession or under the control of a person.

As specified in the GCA, 18 U.S.C. § 921(a)(23), the term "machinegun" has "*the meaning given such term in section 5845(b) of the National Firearms Act (26 U.S.C. 5845(b)).*

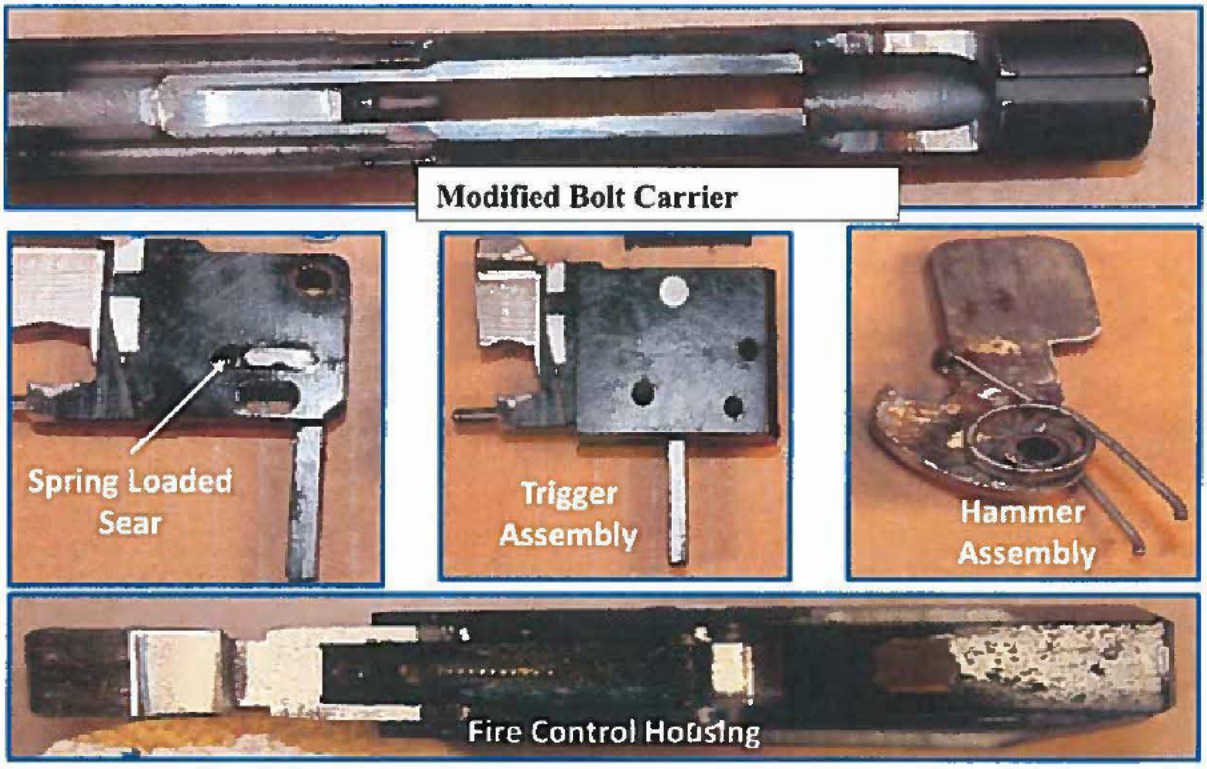
The submitted [redacted] AR1, is described as a "*trigger-finger reset device*". You further describe the design and function of the device by explaining that "***this trigger system works by mechanically pushing the trigger rapidly forward, resetting the finger and trigger to the forward***

positon. This allows the user to make a decision in which they leave rearward pressure off the trigger to stop the firing sequence, or re-engage rearward pressure on the trigger to continue the firing sequence. " As a part of this description, you note that all of the components of the [redacted] AR1 trigger are newly designed and include a bolt, housing, trigger, hammer, sear, springs and pins. FTISB notes that US Patent 9568264 (Flex-fire technology) covers the device, which is described as a technology to provide the potential of increasing both the rate of fire and the precision of fire at higher rates beyond the fundamental design capabilities of pre-existing semi-automatic arms.

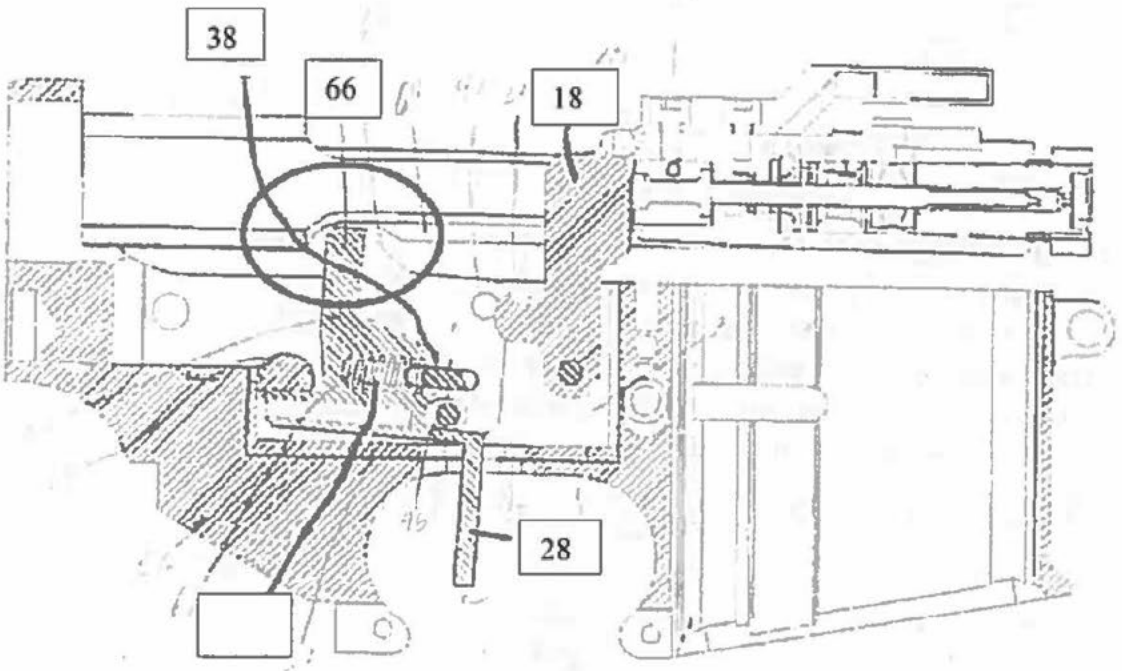
Also, your correspondence notes that ATF has previously interpreted the phrase "single function of the trigger" to mean a single movement of the trigger, whether that movement is the pull of the trigger or the release of the trigger and it is your opinion that this device submitted is only a trigger reset device and not a "machinegun" as defined.

The sample examined by FTISB personnel consists of a Colt Competition .223/5.56 caliber AR-15 pattern rifle, serial number CCR012176, which is equipped with the following items:

- Modified bolt carrier.
- Newly constructed hammer assembly.
- Newly constructed fire control housing.
- Newly constructed trigger assembly having steel block mounted on rear of assembly.
- Newly constructed spring loaded sear assembly.
- Miscellaneous retaining axles/screws, plungers/springs.



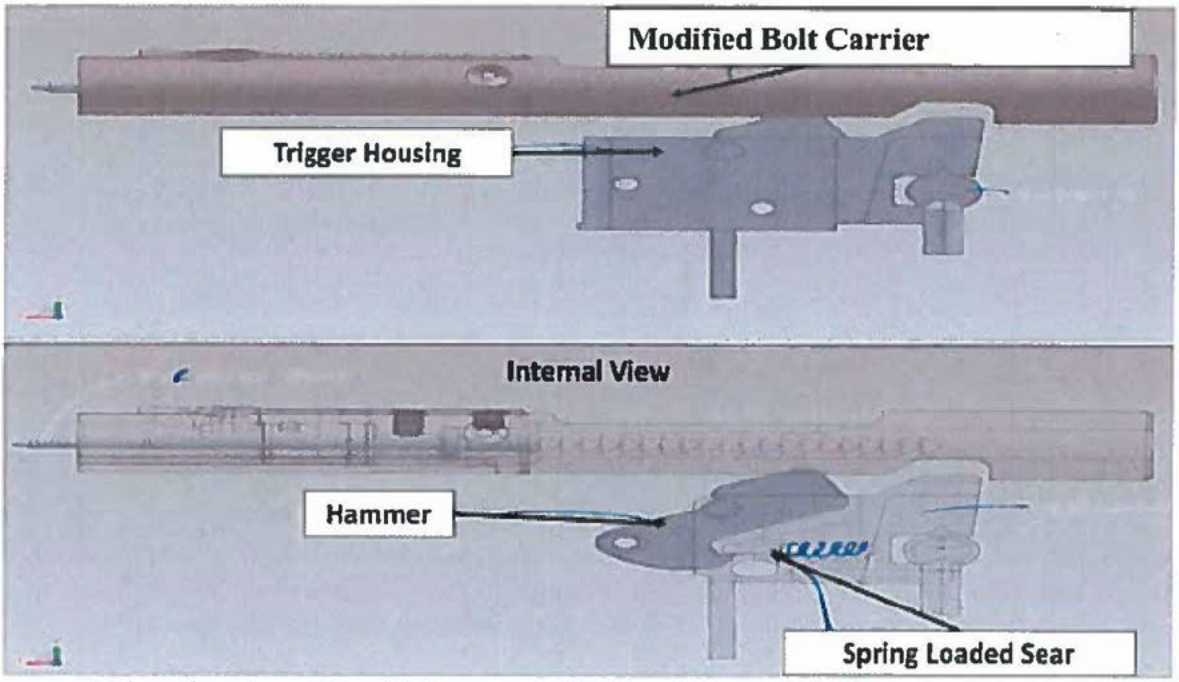
Provided illustration of [redacted] AR1 Trigger Device.



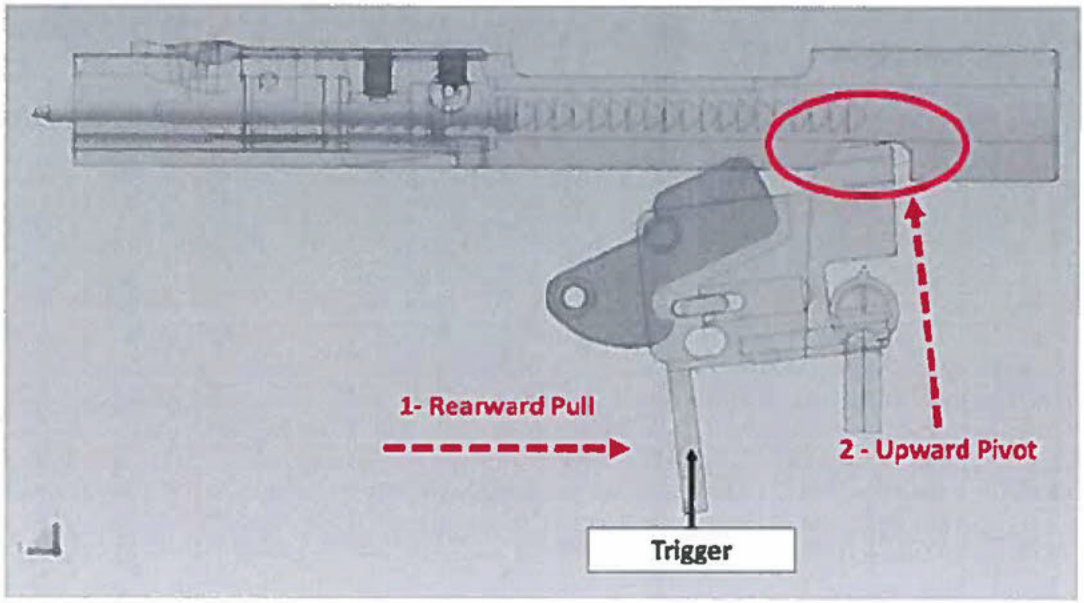
This illustration depicts how the parts interact.
No. 66 is the extension of the trigger that rests in the bolt cam.
No. 28 is the portion of the trigger that interacts with the user's finger.
No. 38 is the spring loaded sear.
No. 18 is the hammer.

The written correspondence received from [redacted] with the sample, provided the following statements and pictures offering a description of how the device differed in function from that of a standard unmodified AR-15 pattern rifle [Note: FTISB updated the pictures relevant to FTISB's analysis of the [redacted] AR1]:

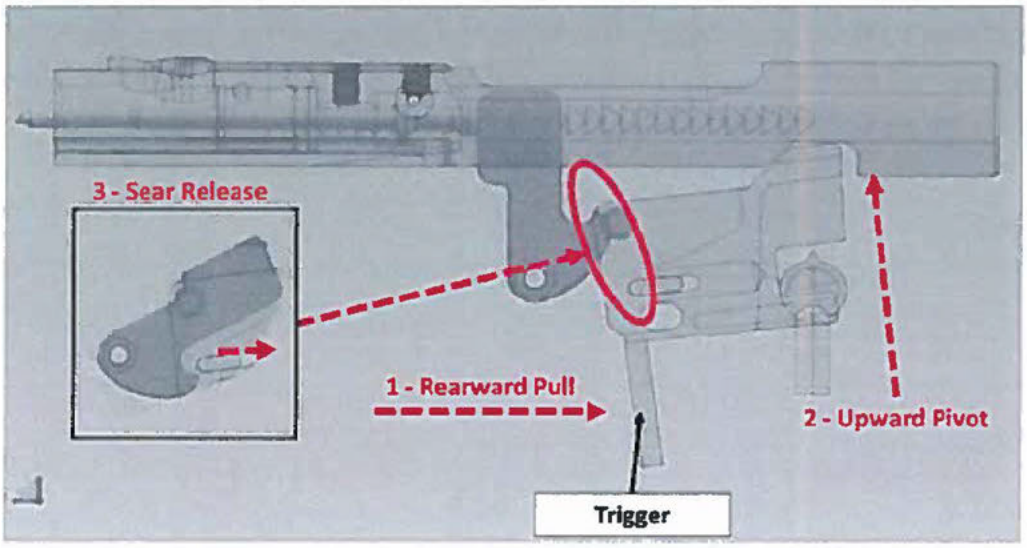
"We start with the trigger in the forward position and the hammer in the cocked position, with the bolt in battery."



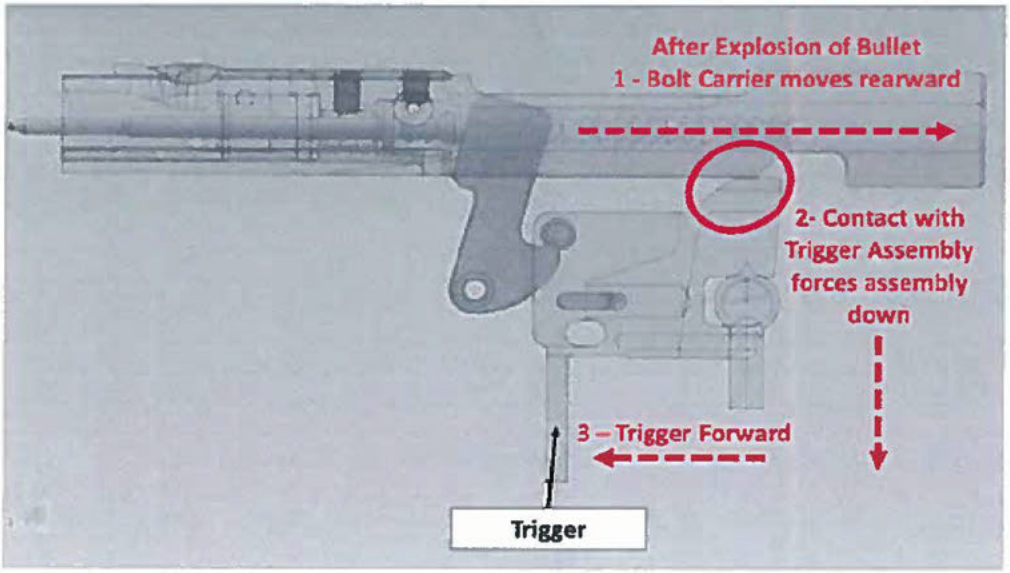
"When the trigger is pulled rearward it also pivots upward into an open space in the bolt.



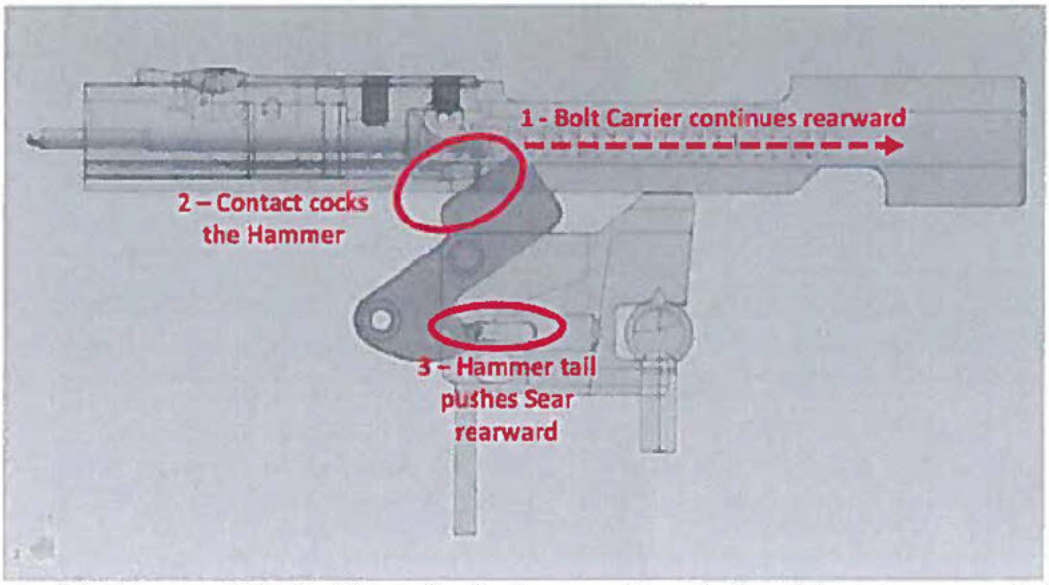
"As the trigger pivots back and up into the open space in the bolt, the sliding sear surface in the trigger separates from the tail of the hammer and the hammer releases and fires a round."



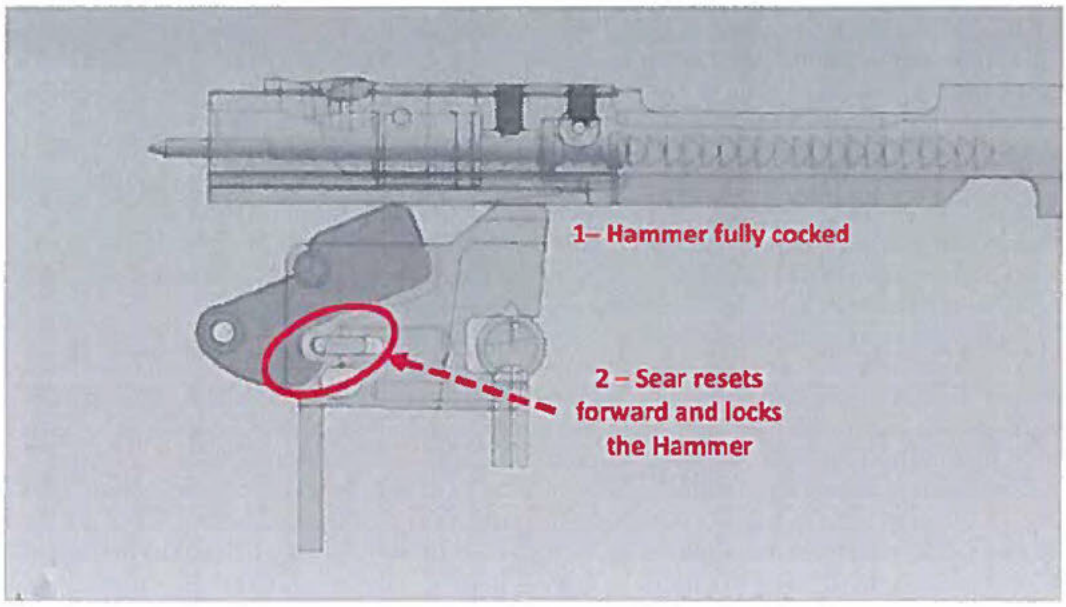
"The explosion of the bullet causes the bolt to move in a rearward direction. As the bolt moves rearward it contacts the top of the trigger and forces the tip of the trigger down, pivoting the blade of the trigger to the forward (reset) position."



"At this point the trigger is in the forward (un-pulled) position. The bolt continues rearward cocking the hammer, which moves the integrated trigger sear rearward". [We note that the shooter maintains a constant rearward pull on the trigger and the internal mechanism automatically forces the individual's finger/trigger forward instead of requiring that the shooter release the trigger.]



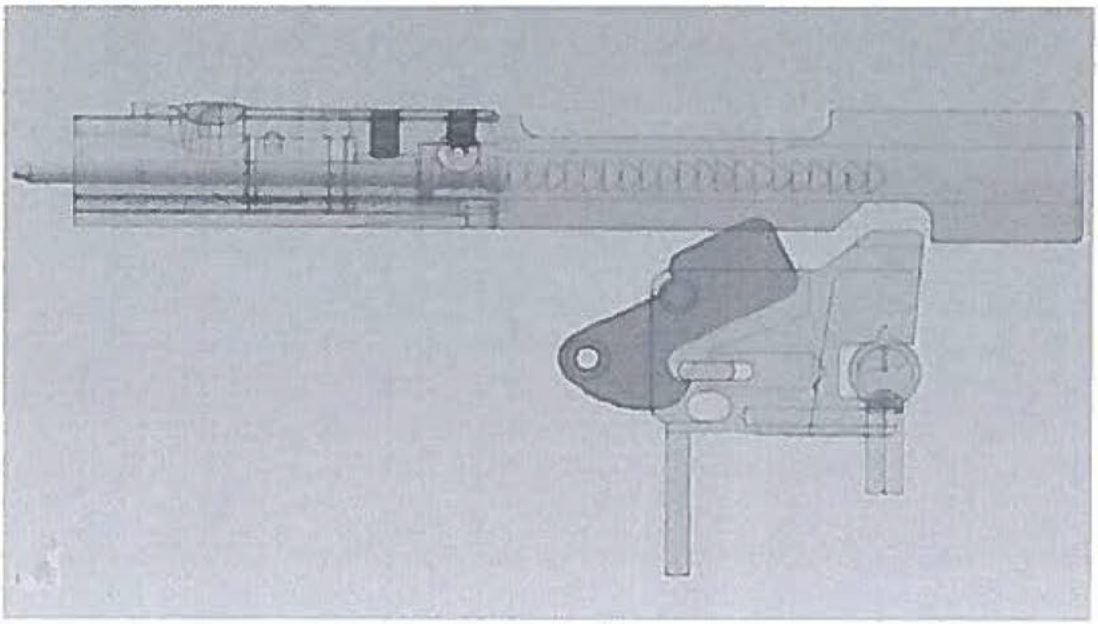
"At the rear of the bolt's stroke the hammer is cocked and the trigger sear is forced forward into a reset position (by spring pressure), locking the hammer in the cocked position."



"The bolt returns to battery and the hammer is now cocked against the trigger ready to fire the next round".

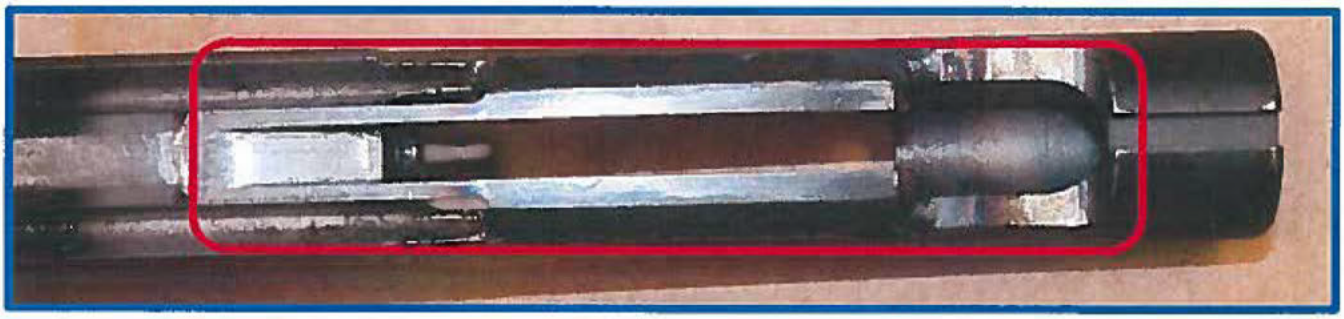
As explained below, a single constant rearward pull will cause the firearm to fire until the trigger is released, the firearm malfunctions, or the firearm exhausts its ammunition supply.

[redacted]



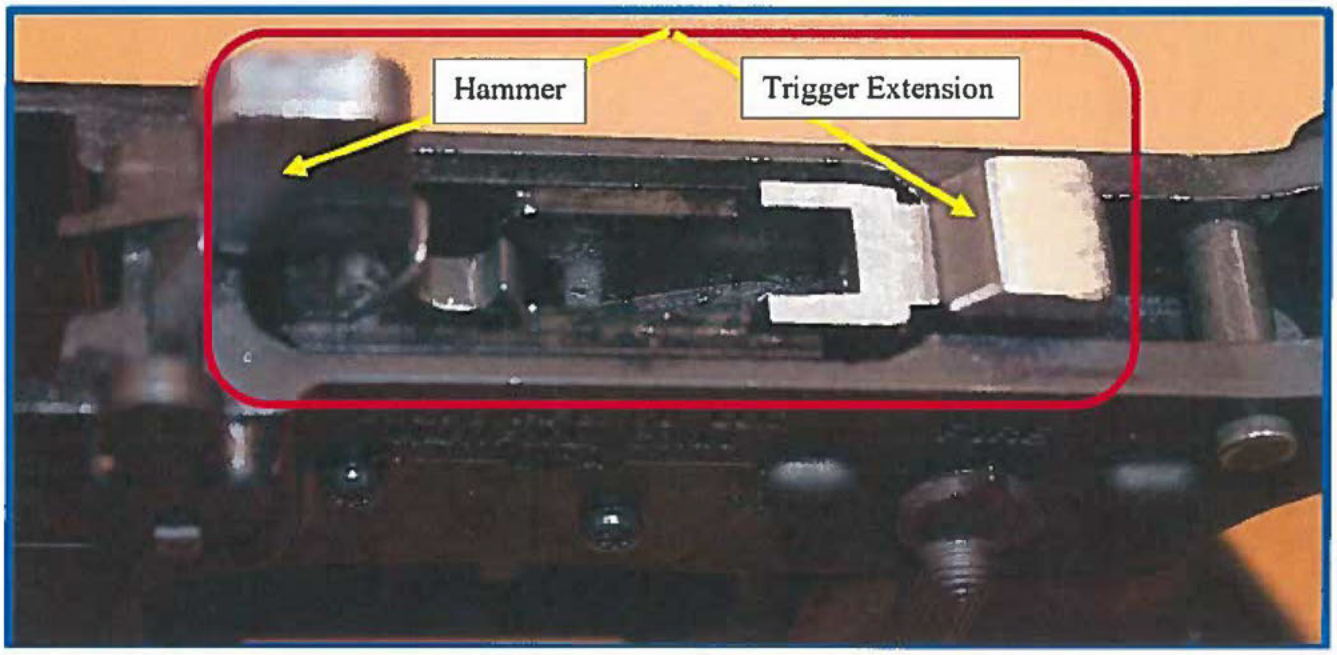
Submitted Sample Rifle

Sample modified bolt carrier showing added contact surface that interfaces with trigger.

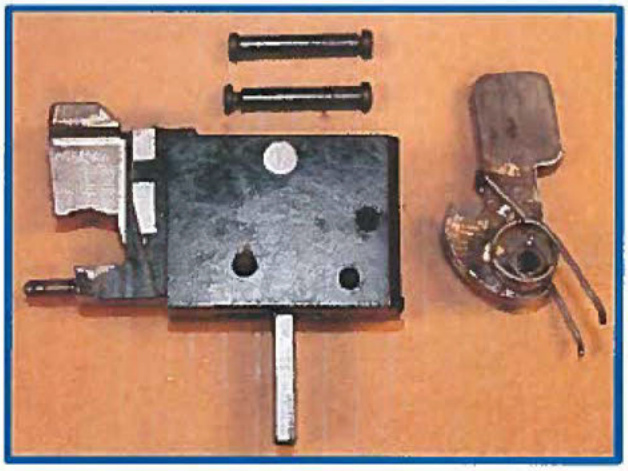


FTCB exemplar standard bolt carrier.

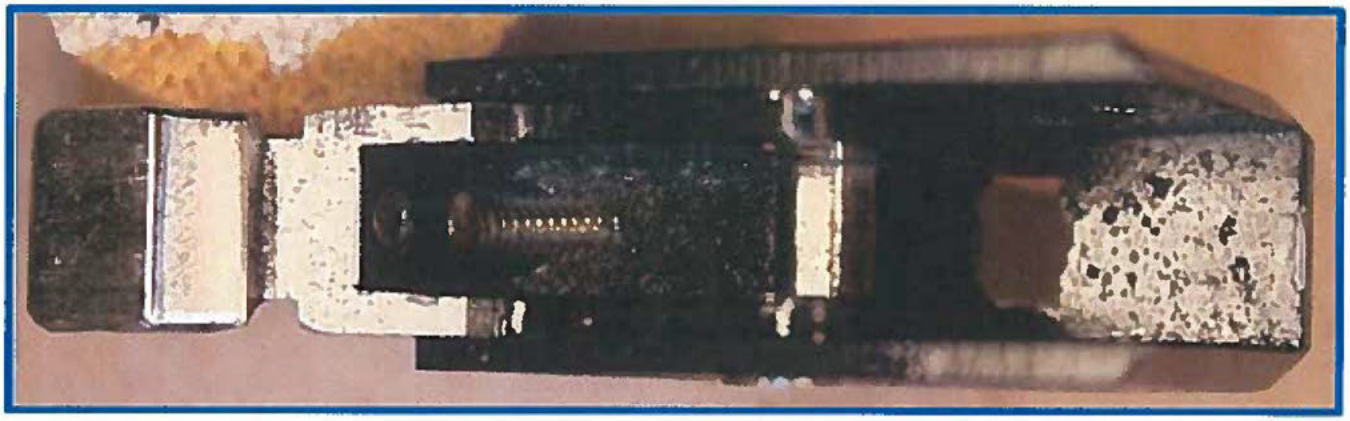
Internal View - Sample fire control mechanism (installed).



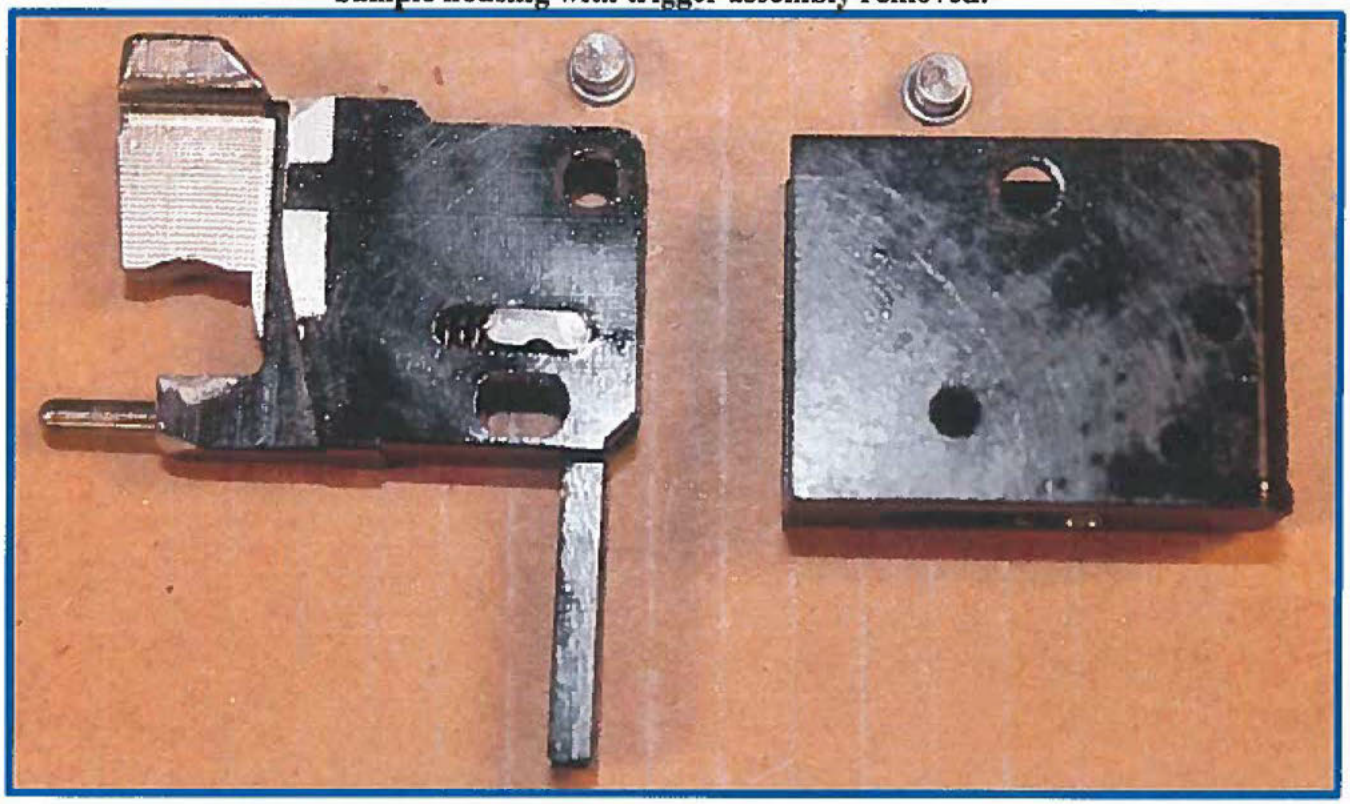
Sample fire control mechanism with the bolt carrier removed from firearm.



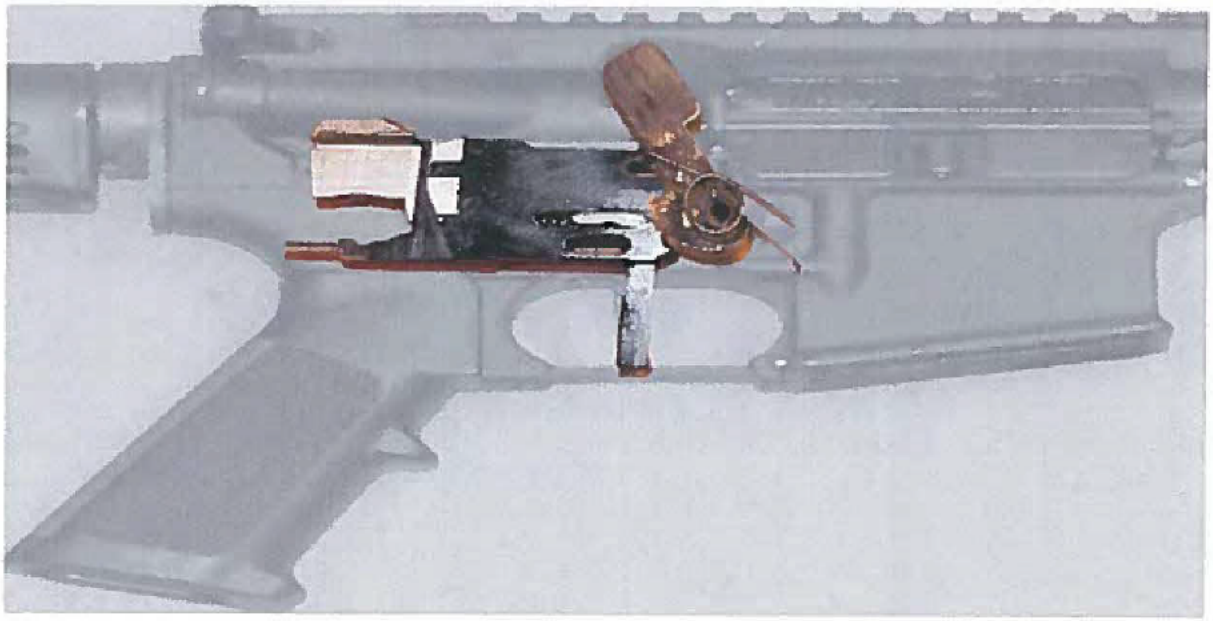
Overhead view of fire control mechanism



Sample housing with trigger assembly removed.



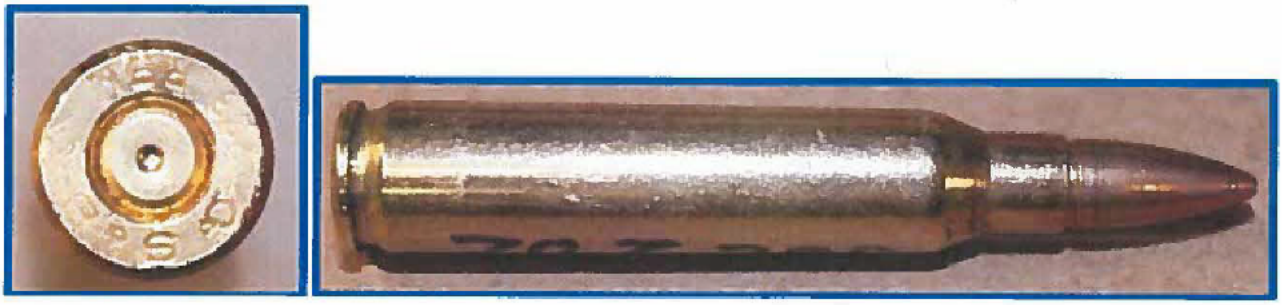
Sample [redacted] AR1 fire control mechanism installed in AR-15 type firearm.



As a part of this examination, FTISB conducted initial manual field-testing of the sample. The field test revealed that when the trigger was pulled with sufficient force to release the hammer, and the shooter maintains constant pressure on the trigger, the firearm expelled a projectile, extracted and ejected the casing, loaded another round, and fired. This continued until the trigger was released. A test fire with live ammunition resulted in the firearm shooting automatically more than one shot, without manual reloading, by a single function of the trigger.

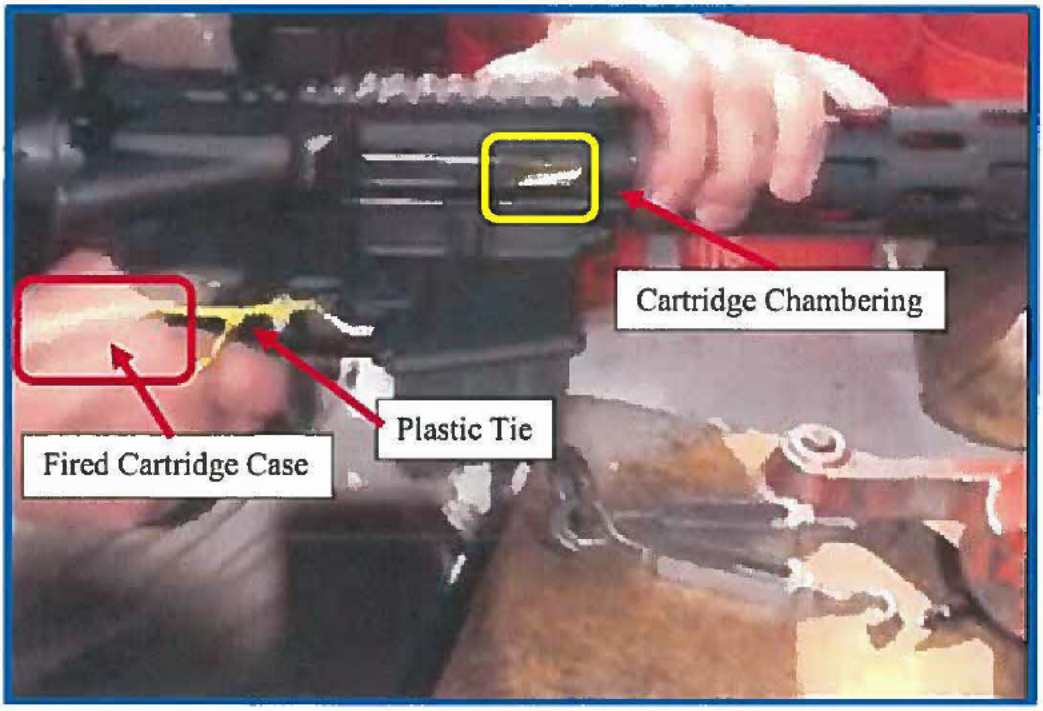
Additionally, during the finger activated firing sequences (with the trigger finger retained in a constant position), after firing several cartridges the sear failed to retain the hammer, which simply followed the bolt forward leaving a substantial firing pin mark on the primer of the chambered cartridge without firing the cartridge.

Photo of FTISB test cartridge removed from sample after hammer follow incident.



In order to demonstrate the sample fired more than one shot, without manual reloading, with a single function of the trigger, rather than firing a single shot with each function of the trigger, the following procedure was followed.

- A common 8-inch zip-tie was installed around the rear of the grip and the front of the sample's trigger.
- The zip-tie was gradually tightened until the trigger was retracted just enough to release the hammer.
- With the trigger retained in this position, the bolt assembly was retracted and retained in an open position, with the aid of the bolt catch.
- A ten-round ammunition load was placed into the sample's magazine, and the magazine was inserted into the firearm.
- Without touching the trigger (which was being retained in a fixed position by the plastic zip-tie), the bolt catch was depressed allowing the firearms bolt to travel forward and chamber a cartridge. Upon chambering and firing the first cartridge, the weapon cycled and fired five cartridges automatically without the trigger being released. The sear also failed to retain the hammer on the 6th cartridge, but did not strike the primer with sufficient force to fire that cartridge, thereby stopping the firing sequence.
- This same test was repeated several times with the sample firing from three to ten cartridges with a single function of the trigger before a malfunction was encountered or the ammunition load expended.



The previous still image extracted from a video of the FTISB test fire shows cartridge chambering in the yellow box and one of the ejected cartridges in the red box. Note that additional ejected cartridge cases are out of frame and trigger is retained with zip-tie and not in contact with finger.

Federal law defines "machinegun," in relevant part, as "any weapon which shoots, is designed to 1shoot, or can be readily restored to shoot, automatically more than one shot, without manual reloading, by a single function of the trigger" as well as a "combination of parts designed and intended, for use in converting a weapon into a machinegun." Legislative history for the NFA indicates that the drafters equated a "single function of the trigger" with "single pull of the trigger." National Firearms Act: Hearings Before the Comm. on Ways and Means, House of Representatives, Second Session on H.R. 9066, 73rd Cong., at 40 (1934). Therefore, as you note, ATF has long held that a single function of the trigger is a "single pull" or alternatively, a single release of a trigger. Therefore, a firearm is not a machinegun if a projectile is expelled when the trigger is pulled and a second projectile is expelled when the trigger is released.

As stated above, your own description of the [redacted] AR1 trigger system includes the following statements, "*this trigger system works by mechanically pushing the trigger rapidly forward, resetting the finger and trigger to the forward positon. This allows the user to make a decision in which they leave rearward pressure off the trigger to stop the firing sequence, or re-engage rearward pressure on the trigger to continue the firing sequence.*"

Federal courts have noted that automatically means that the weapon "fires repeatedly with a single pull of the trigger." *Staples v. United States*, 511 U.S. 600, 602 n. 1 (1994). "That is, once its trigger is depressed, the weapon will automatically continue to fire until its trigger is released or the ammunition is exhausted." *Id.* Courts have specifically affirmed ATF's interpretation that a single act of the shooter to initiate the firing sequent is a single function of the trigger. *Akins v. United States*, 312 F. App'x 197, 200 (11th Cir. 2009); *Freedom Ordnance Mfg., Inc. v. Brandon*, No. 3:16-cv-00243-RLY-MPB (S.D. Ind. Mar. 27, 2018). *United States v. Fleischli*, 305 F.3d 643, 655 (7th Cir. 2002)(in which electronic switch was the trigger when it served to initiate the firing sequence and the minigun continued to fire until the switch was turned off or the ammunition was exhausted). In the *Freedom Ordnance* case, the United States District Court of Indiana confirmed that ATF was not arbitrary and capricious in the classification of an "electronic reset assist device" as a machinegun even though the firearm's trigger reset before each shot by pushing the shooter's finger forward. *Freedom Ordnance Mfg., Inc*, No. 3:16-cv-00243-RLY-MPB. In these cases, a firearm is a machinegun when an internal mechanism or operation automatically forces the individual's finger forward instead of requiring that the shooter release the trigger.

FTISB testing indicated that continuous rearward pressure after the initial pull of the trigger initiates a "firing sequence" which discharges multiple rounds with a single function of the trigger. A device with a trigger that is mechanically forced forward during a cycle of operation or firing sequence, which results in more than one round being fired with a "single function of a trigger," is a machinegun. This type of operation is distinguishable from firearms that have not been classified as machineguns, including those that fire one round when the trigger is manually pulled and one round when the trigger is manually released.

[redacted]

The [redacted] AR1 is a device which is designed to assist in preventing the hammer from positively resetting (requiring that the shooter release the trigger in order to fire the next round) and causes a firearm to shoot automatically more than one shot, without manual reloading, by a single function of the trigger. This device is a, combination of parts designed and intended, solely and exclusively, for use in converting a weapon into a machinegun; thus a "machinegun" as defined in 26 U.S.C. § 5845(b).

Additionally, note that on several occasions during the testing of this device, the hammer was found to have followed the bolt into battery as it chambered a cartridge. FTISB has also evaluated similar devices, which have prevented the trigger from positively resetting and resulted in such a "hammer-follow" scenario. A device designed to prevent the hammer from positively resetting could cause a firearm to shoot automatically more than one shot, without manual reloading, by a single function of the trigger, and would also be classified as a combination of parts designed and intended, solely and exclusively, for use in converting a weapon into a machinegun; thus a "**machinegun**" as defined in 26 U.S.C. 5845(b).

Consequently, the submitted sample [redacted] AR1 trigger assembly equipped firearm is a "machinegun" as defined in the NFA, and is subject to all NFA provisions. In addition, the sample [redacted] AR1 trigger assembly parts are a combination of parts designed and intended, for use in converting a weapon into a machinegun, and as such, in and of themselves, would be defined as a "machinegun" and subject to all NFA provisions.

The GCA prohibits the possession or transfer of any machinegun manufactured after May 19, 1986 with the limited exceptions of transfers to or by the government, and possession under the authority of the government. *See* 18 U.S.C. § 922(o). Based on these exceptions, Type 07 (manufacturer) and Type 08 (importer) Federal firearms licensees to manufacture or import firearms after May 19, 1986 for sale or distribution to the government. Because you are a 07/02 FFL/SOT, ATF will return the [redacted] AR1 trigger device equipped firearm upon receipt of a prepaid common carrier shipping label or FedEx shipping account billing number. Please be advised that the firearm/device will need to be properly marked, and an ATF Form 2 submitted by the close of the following business day that you receive the sample.

We thank you for your inquiry and trust that the foregoing has been responsive.

Sincerely yours,

Michael R. Curtis
Chief, Firearms Technology Industry Services Branch

cc: Rick Vasquez Firearms LLC

UPS

Shipped from: [redacted]
Buda, TX 78610
07/02 FFL/SOT

Rick Vasquez Firearms LLC
235 Deer Creek Road
Winchester VA 22602

RECEIVED
AUG 09 2017
BY. FATD

EVAL.
307-385

The [redacted] AR1 trigger system is being submitted for evaluation as a trigger-finger reset device. This trigger system works by mechanically pushing the trigger rapidly forward, resetting the finger and trigger to the forward position. This allows the user to make a decision in which they leave rearward pressure off the trigger to stop the firing sequence, or re-engage rearward pressure on the trigger to continue the firing sequence. It is our opinion that this device submitted is only a trigger reset device, nevertheless it has been submitted for your classification.

Definitions: COLT COMPETITION SN: CCR012176
AR-15

A firearm: 18 U.S.C. § 921(a)(3), the Gun Control Act of 1968 ("GCA") defines the term "firearm" to include "any weapon (including a starter gun) which will or is designed to or may be readily converted to expel a projectile by the action of an explosive, the frame or receiver of any such weapon…"

A machinegun: 26 U.S.C. § 5845(b), the National Firearms Act, Title II of the GCA ("NFA"), defines "machinegun" to include "any weapon which shoots, is designed to shoot, or can be readily restored to shoot, automatically more than one shot, without manual reloading, by a single function of the trigger. This term shall also include the frame or receiver of any such weapon, any part designed and intended solely and exclusively, or combination of parts designed and intended, for use in converting a weapon into a machinegun, and any combination of parts from which a machinegun can be assembled if such parts are in the possession or under the control of a person." (The mechanical function of the [redacted] AR1 trigger does not fall within the definition of "machinegun" under the NFA.)

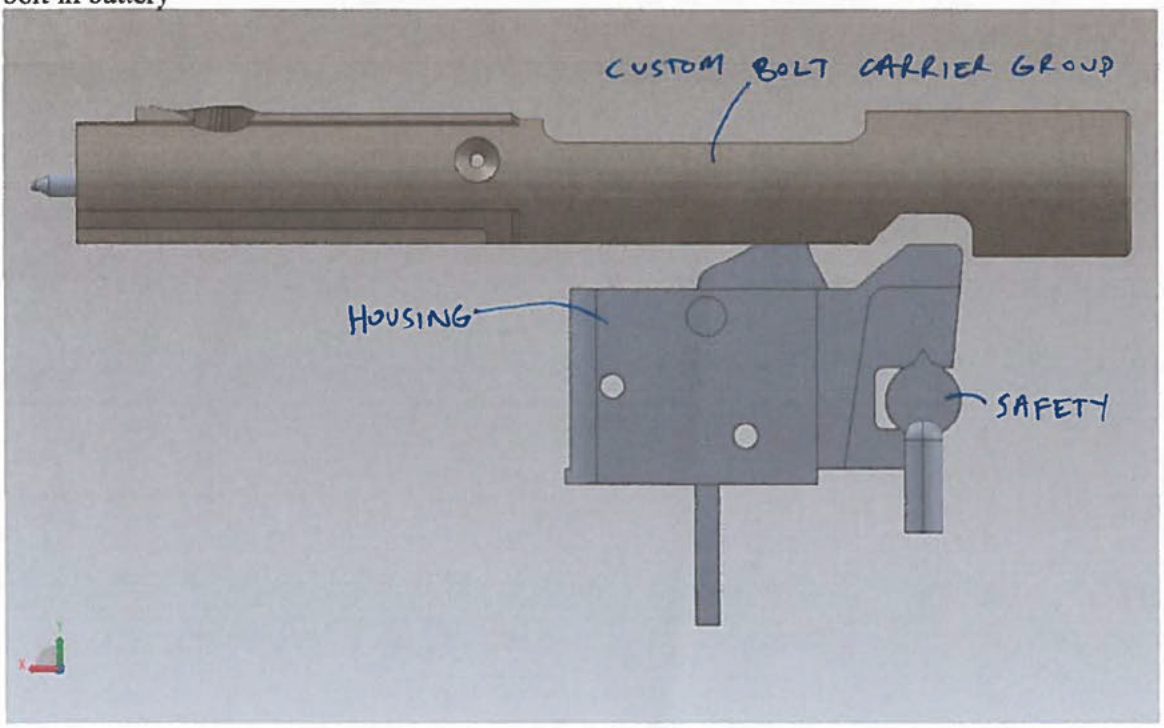
ATF has previously interpreted the phrase "single function of the trigger" to mean a single movement of the trigger, whether that movement is the *pull* of the trigger or the *release* of the trigger. A trigger "functions" by causing the firing sequence to begin. This could be described as the release of a hammer or a striker.

Consequently, if the firearm or device will allow more than one shot to fire when the trigger is pulled or when the trigger is released, then the firearm would have the capability to fire more than one shot by the single function of the trigger. This would make the firearm a machinegun as defined.

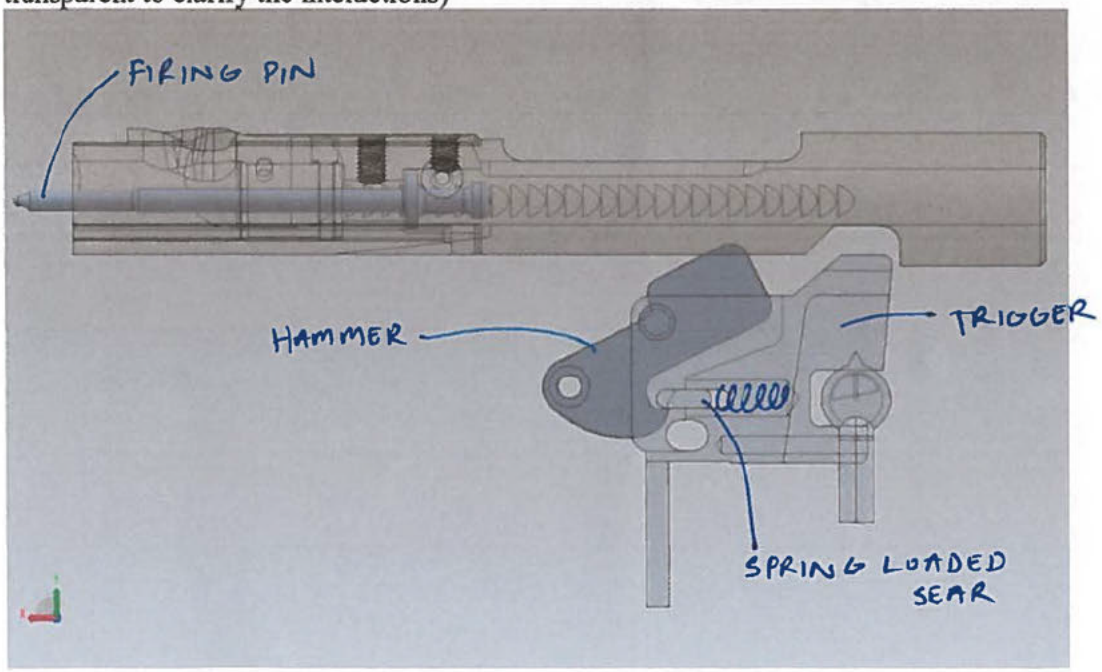
The [redacted] AR1 trigger is specifically designed to only fire a single round on each rearward movement of the trigger. All of the components of the [redacted] AR1 trigger are newly designed and include a bolt, housing, trigger, hammer, sear, springs and pins. These components interact in a manner which, upon pulling the trigger, the hammer is released from the sear firing a single round. In layman's terms, following is the firing sequence:

[redacted] AR1 Trigger:

We start with the trigger in the forward position and the hammer in the cocked position, with the bolt in battery

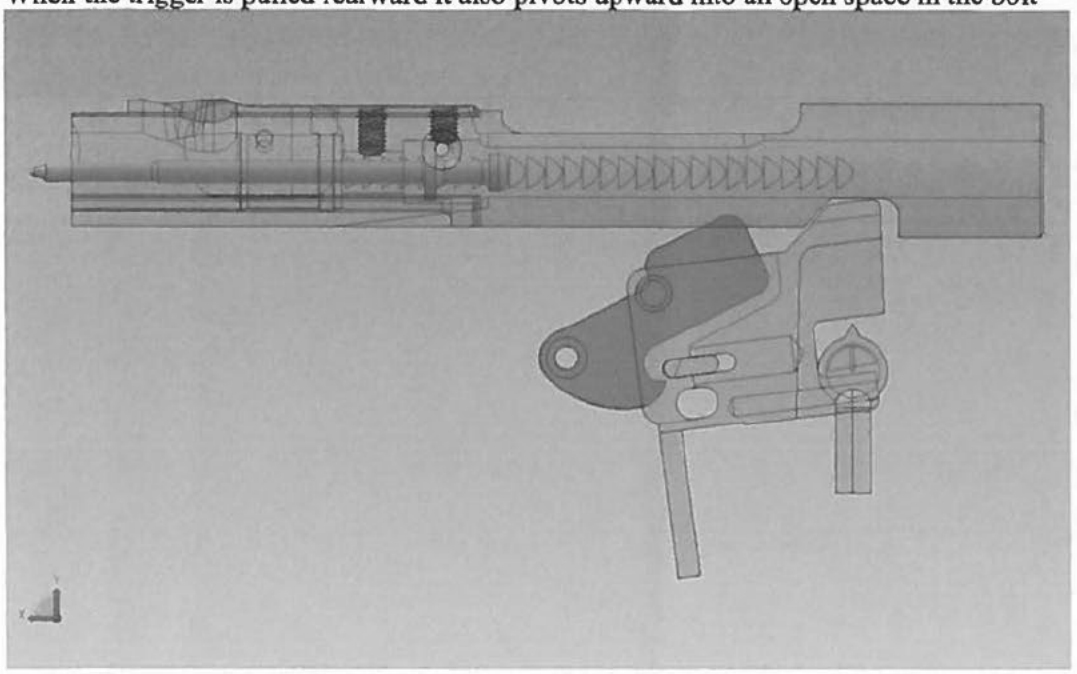


(In the rest of the images, not all parts are shown in all images and some are shown as transparent to clarify the interactions)

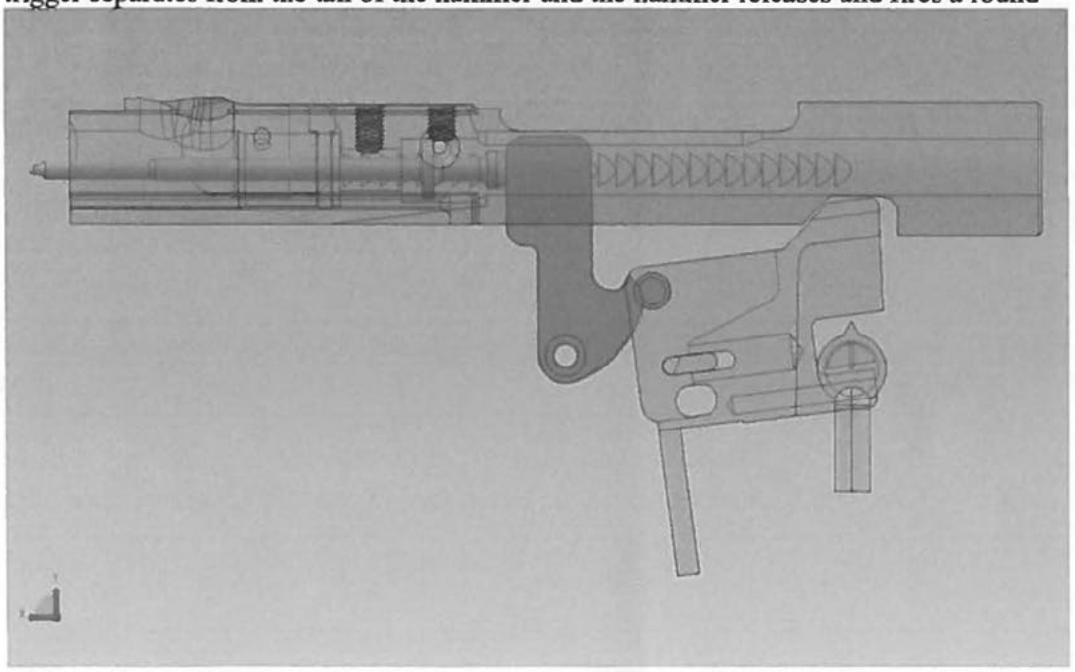


[redacted] AR1 Trigger:

When the trigger is pulled rearward it also pivots upward into an open space in the bolt

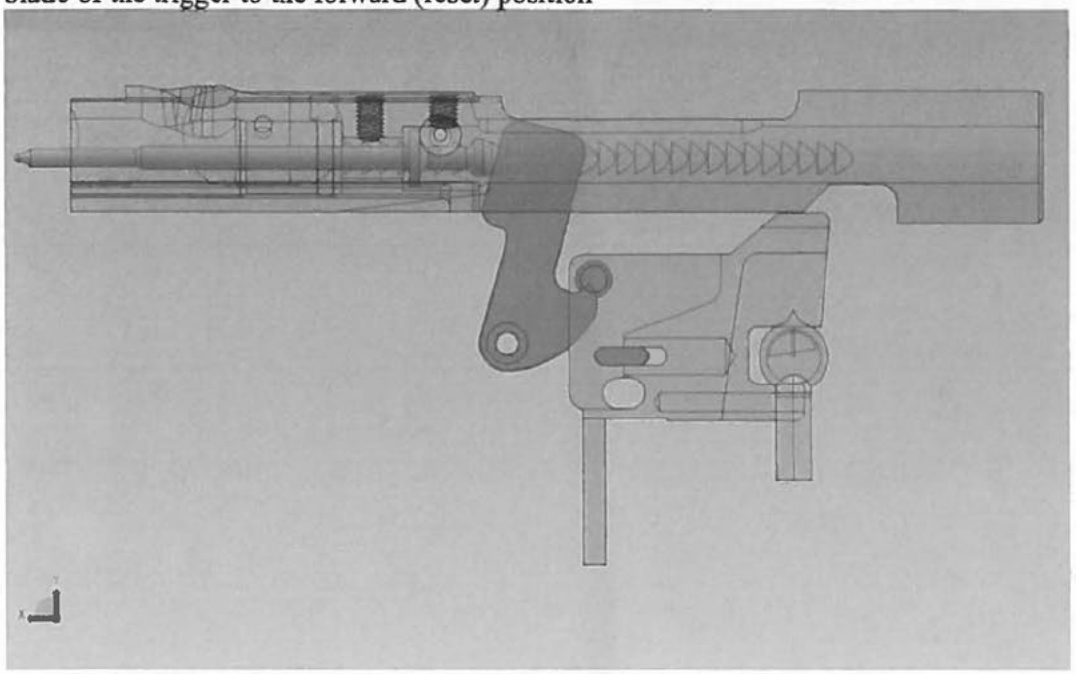


As the trigger pivots back and up into the open space in the bolt, the sliding sear surface in the trigger separates from the tail of the hammer and the hammer releases and fires a round

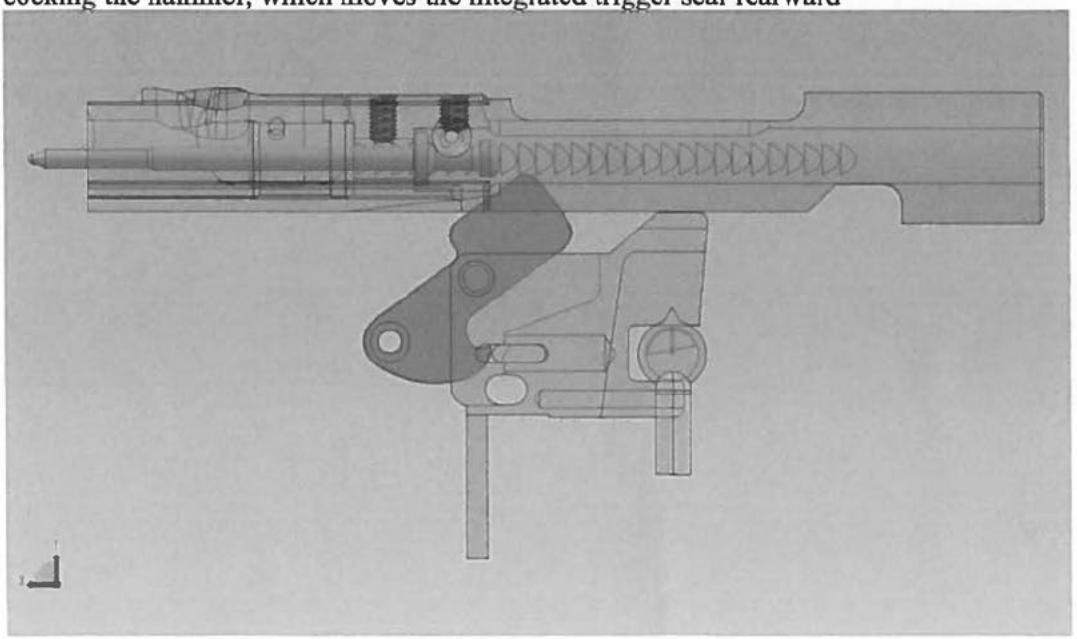


[redacted] AR1 Trigger:

The explosion of the bullet causes the bolt to move in a rearward direction. As the bolt moves rearward it contacts the top of the trigger and forces the top of the trigger down, pivoting the blade of the trigger to the forward (reset) position

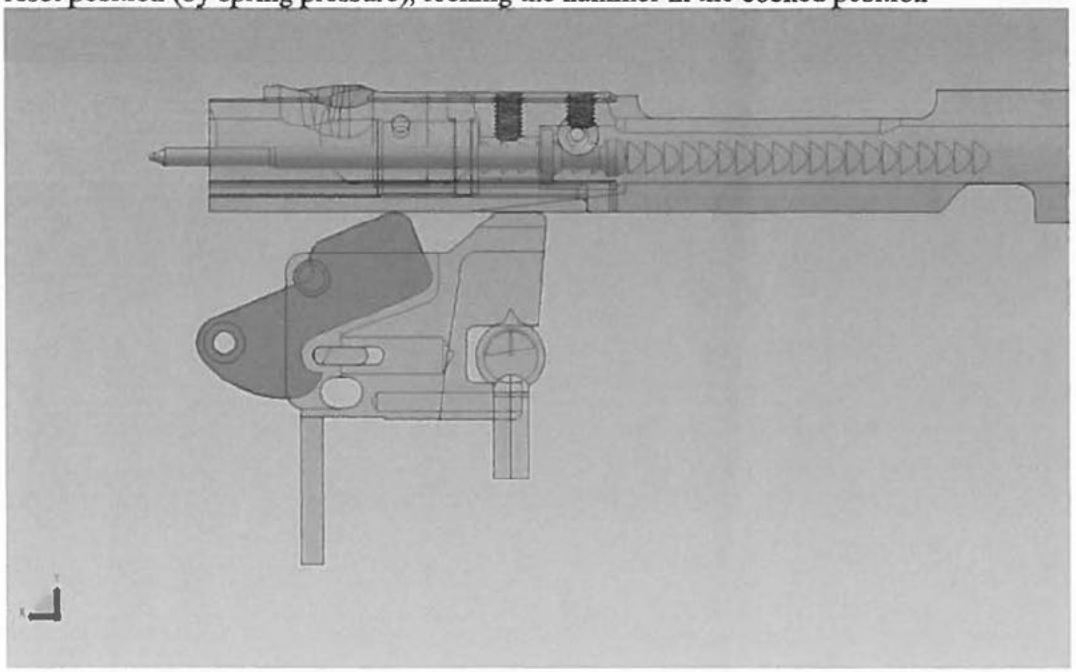


At this point the trigger is in the forward (unpulled) position. The bolt continues rearward cocking the hammer, which moves the integrated trigger sear rearward

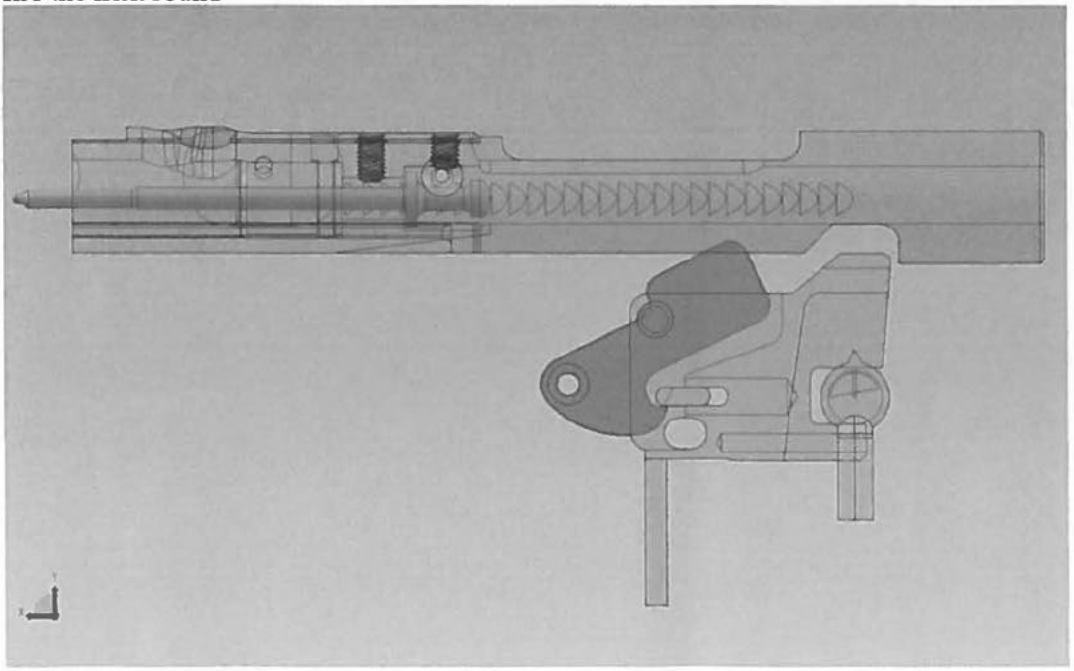


[redacted]tical AR1 Trigger:

At the rear of the bolt's stroke the hammer is cocked and the trigger sear is forced forward into a reset position (by spring pressure), locking the hammer in the cocked position



The bolt returns forward to battery and the hammer is now cocked against the trigger ready to fire the next round



[redacted] AR1 Trigger:

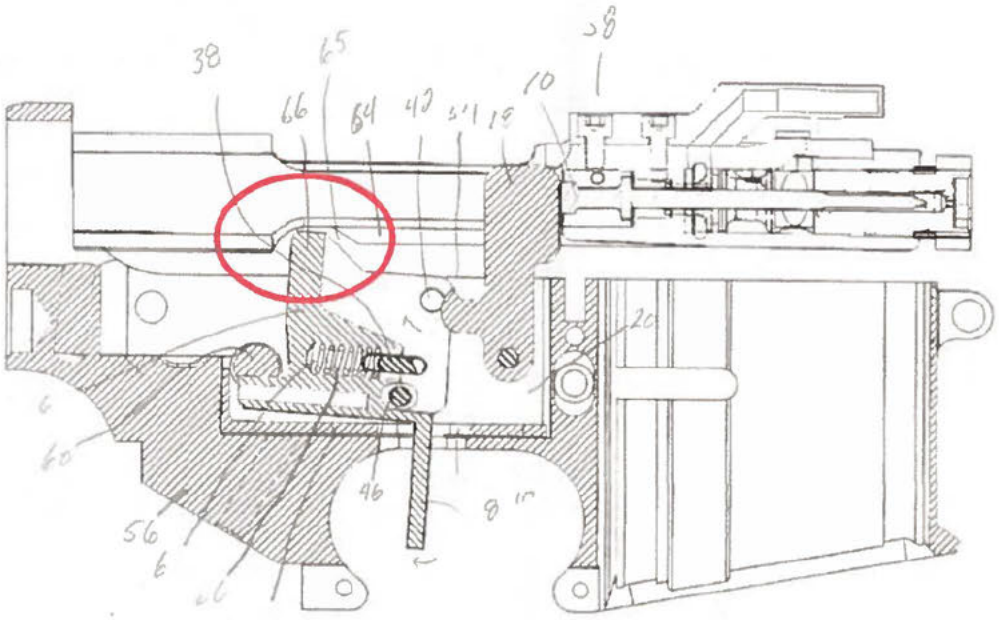
This is not an automatic sear, nor a conversion device. An automatic sear or a conversion device depends on a captured hammer that is tripped in some manner. This allows repetitive firing once the trigger is pulled rearward and the trigger remains in the pulled rearward position. The [redacted] AR1 trigger is a trigger finger reset device. The sequence of operation is designed so that when a shooter pulls the trigger and the weapon is fired, the trigger mechanically resets the user's trigger finger back to the original firing position. After the round has been fired, the trigger cannot be pulled during any part of the duration of the stroke of the bolt until the bolt has returned to battery. This ends the firing sequence or allows the user to mentally exert additional rearward pressure on the trigger to restart the firing sequence by pulling the trigger again. The design of the trigger mechanism is such that if the user maintains excessive rearward finger pressure on the trigger, the bolt's ability to return to battery will be impeded. The purpose and design of this device is to aid the user to fire a consecutive shot.

Conclusion:

It is our opinion that this is not a device designed or intended to create automatic fire. If you have any questions or need additional information I have authorized Rick Vasquez of Rick Vasquez Firearms LLC to act on my behalf. Rick Vasquez can be reached at (540) 535-6633. Thank you in advance for your efforts and we look forward to hearing your opinion.

[redacted] AR1 Trigger:

7



This illustration depicts how the parts interact.

No.66 is the extension of the trigger that rests in the bolt cam.

No. 28 is the portion of the trigger that interacts with the user's finger.

No. 38 is the spring loaded sear.

No. 18 is the hammer.

From: Richard Vasquez
To: Fire Tech
Subject: Re: US Patent Information Evaluation 307385
Date: Monday, November 27, 2017 3:52:40 PM

The patent for the general mechanism is:
Flex-Fire technology
US 9568264

This patent was published (approved) Feb 14, 2017.

Sincerely,

Richard Vasquez
Rick Vasquez Firearms, LLC
235 Deer Creek Road
Winchester, VA
Phone: [redacted]
Email: [redacted]

On Mon, Nov 27, 2017 at 2:38 PM, [redacted] > wrote:

> Our office is currently reviewing a submission from [redacted] LLC (AR1 trigger) which appears to include a patent drawing. Has a patent been applied for on this device and if so, what would be the Name and patent number?
>
> Thank you, FTISB

790894154587

RTN

Delivered

307-385

Thursday 11/08/2018 at 12:36 pm

DELIVERED

Signed for by: RROUDS

GET STATUS UPDATES

OBTAIN PROOF OF DELIVERY

FROM	TO
MARTINSBURG, WV US	Buda, TX US

Travel History

			Local Scan Time
Thursday, 11/08/2018			
12:36 pm	Buda, TX	Delivered	
4:26 am	AUSTIN, TX	On FedEx vehicle for delivery	
4:14 am	AUSTIN, TX	At local FedEx facility	
Wednesday, 11/07/2018			
10:28 pm	HUTCHINS, TX	Departed FedEx location	
12:16 pm	HUTCHINS, TX	Arrived at FedEx location	
6:49 am	HUTCHINS, TX	In transit	
Tuesday, 11/06/2018			
5:00 pm	LINDEN, TN	In transit	
3:59 am	HAGERSTOWN, MD	Departed FedEx location	
1:04 am	HAGERSTOWN, MD	Arrived at FedEx location	
12:21 am	WINCHESTER, VA	Left FedEx origin facility	
Monday, 11/05/2018			
9:02 pm	WINCHESTER, VA	Arrived at FedEx location	
11:25 am	WINCHESTER, VA	Picked up	
Thursday, 11/01/2018			
11:26 pm		Return label link emailed to return sender	

Daris
Received
11/5/18

After printing this label:

1 Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2 Fold the printed page along the horizontal line.
3 Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: IMPORTANT: TRANSMIT YOUR SHIPPING DATA AND PRINT A MANIFEST.
At the end of each shipping day, you should perform the FedEx Ground End of Day Close procedure to transmit your shipping data. [illegible] End of Day Close Button. If required, print the pickup manifest that appears. A printed manifest is required to be tendered along with your packages if they are [illegible] FedEx Ground. If you are dropping your packages off at a FedEx drop off location, the manifest is not required.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide and applicable tariff, available upon request. FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations, including limitations on our liability, can be found in the current FedEx Service Guide and applicable tariff; apply. In no event shall FedEx Ground be liable for any special, incidental, or consequential damages, including, without limitation, loss of profit, loss to the intrinsic value of the package, loss of sale, interest income or attorney's fees. Recovery cannot exceed actual documented loss. Items of extraordinary value are subject to separate limitations of liability set forth in the Service Guide and tariff. Written claims must be filed within strict time limits, see current FedEx Service Guide.

From: [redacted]
Subject: RE: Submission for testing and classification
Date: September 17, 2018 at 7:40 AM
To: [redacted]

Sir,

You can forward the shipping label or FedEx Billing number referencing work order #307385 and note that item should not be shipped until Oct3.

Thankyou.

From: Fire Tech
Sent: Monday, September 17, 2018 7:53 AM
To:
Subject: FW: Submission for testing and classification

See below.

From: [redacted]
Sent: Friday, September 14, 2018 3:57 PM
To: Fire Tech [redacted]
Subject: Re: Submission for testing and classification

I received a ruling on this submission. Attached is a photo of the letter I received in order to reference the ID #.

Per the last page of the letter, I would like to have the sample firearm and device returned as I have an 07/02 FFL/SOT. I accidentally failed to include a prepaid return shipping label with my submission but as I said, I would like it to be returned to me.

I will be away from my FFL shipping address until Tuesday, Oct 2nd. This would not matter except per the letter, I need to submit an ATF Form 2 by the close of the following business day that I receive the sample, and I will not be able to do that until Oct 3rd.

If this is not a problem I will send a prepaid common carrier shipping label or email a Fedex shipping account billing number.

Thank you kindly,

[redacted]

U.S. Department of Justice

Bureau of Alcohol, Tobacco,
Firearms and Explosives

Martinsburg, WV 25405

www.atf.gov

AUG 2 8 2018

907010: RKD
3311/307385

[redacted]
Buda, Texas 78610

Dear Sir,

This is in reference to your submission and accompanying correspondence to, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), Firearms Technology Industry Services Branch (FTISB), accompanied by an AR-15 type rifle equipped with what is described as the [redacted] AR1 trigger system (see enclosed photos). Specifically, you requested an examination and classification of this sample with regard to the amended Gun Control Act of 1968 (GCA) and the National Firearms Act (NFA).

As you know, the National Firearms Act (NFA), 26 U.S.C. § 5845(b), defines the term "**machinegun**" as—

...any weapon which shoots, is designed to shoot, or can be readily restored to shoot, automatically more than one shot, without manual reloading, by a single function of the trigger. The term shall also include the frame or receiver of any such weapon, any part designed and intended solely and exclusively, or combination of parts designed and intended, for use in converting a weapon into a machinegun, and any combination of parts from which a machinegun can be assembled if such parts are in the possession or under the control of a person.

As specified in the GCA, 18 U.S.C. § 921(a)(23), the term "machinegun" has "*the meaning given such term in section 5845(b) of the National Firearms Act (26 U.S.C. 5845(b)).*

The submitted [redacted] AR1, is described as a "*trigger-finger reset device*". You further describe the design and function of the device by explaining that "*this trigger system works by mechanically pushing the trigger rapidly forward, resetting the finger and trigger to the forward*

On Aug 4, 2017, at 2:16 PM, [redacted] wrote:

Firearms and Ammunition Technology Division
Attn: FTISB
244 Needy Road Suite 1600
Martinsburg, West Virginia 25405

-----Original Message-----
From: [redacted]
Sent: Friday, August 4, 2017 1:26 PM
To: Fire Tech [redacted]
Subject: Submission for testing and classification

Hello,

I am submitting a complete rifle for testing and classification and I would like to confirm that the following is the correct address.

Firearms and Ammunition Technology Division
244 Needy Road Suite 1600
Martinsburg, West Virginia 25405

When sending a complete rifle to this location, is signature required necessary?

Thank you,

[redacted]
FFL/SOT 07/02

.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

Firearms Technology Criminal Branch
Report of Technical Examination

244 Needy Road #1600
Martinsburg, WV 25405

Phone: 304-616-4300
Fax: 304-616-4301

To:
Special Agent Michael T. Nuttall
Bureau of Alcohol, Tobacco, Firearms and Explosives
99 New York Avenue NE
MS: 90K-250
Washington, DC 20026

Date:

UI#: 163080-21-0006

RE: Rarebreed Firearms
FRT-15

FTCB#: 2021-595-DAS
317066

Date Exhibit Received: 06/04/2021

Delivered By: FedEx# 7738 9219 6853

Type of Examination Requested:

Examination, Test, Classification

Exhibit:

1. Rare Breed Triggers, model FRT-15, no serial number (suspected machinegun).

Pertinent Authority:

Title 28 of the United States Code (U.S.C.) provides the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) the authority to investigate criminal and regulatory violations of Federal firearms law at the direction of the Attorney General. Under the corresponding Federal regulation at 28 CFR. 0.130 the Attorney General provides ATF with the authority to investigate, administer, and enforce the laws related to firearms, in relevant part, under 18 U.S.C. Chapter 44 (Gun Control Act) and 26 U.S.C. Chapter 53 (National Firearms Act). Pursuant to the aforementioned statutory and regulatory authority, the ATF Firearms Ammunition and Technology Division (FATD) provides expert technical support on firearms and ammunition to federal, state, and local law enforcement agencies regarding the Gun Control Act and National Firearms Act.

The amended Gun Control Act of 1968 (GCA), defines the term "**machinegun**" has "*the meaning given such term in section 5845(b) of the National Firearms Act (26 U.S.C. 5845(b))*." (See 18 U.S.C. § 921(a)(23).)

The National Firearms Act of 1934 (NFA) **Identification of firearms other than destructive devices**. *"Each manufacturer and importer and anyone making a firearm shall identify each firearm, other than a destructive device, manufactured, imported, or made by a serial number which may not be readily removed, obliterated, or altered, the name of the manufacturer, importer, or maker, and such other identification as the Secretary may by regulations prescribe."* (See 26 U.S.C. § 5842(a).)

The NFA, defines "**firearm**" to mean, in part: *"...(6) a machinegun...."* (See 26 U.S.C. § 5845(a).)

The NFA, defines the term "**machinegun**" as follows: "*...any weapon which shoots, is designed to shoot, or can be readily restored to shoot, automatically more than one shot, without manual reloading, by a single function of the trigger. The term shall also include the frame or receiver of any such weapon, any part designed and intended solely and exclusively, or combination of parts designed and intended, for use in converting a weapon into a machinegun, and any combination of parts from which a machinegun can be assembled if such parts are in the possession or under the control of a person.*" (See 26 U.S.C. § 5845(b).)

27 CFR § 479.11 defines the term "**machinegun**" and includes, in part: *"...For purposes of this definition, the term "automatically" as it modifies "shoots, is designed to shoot, or can be readily restored to shoot," means functioning as the result of a self-acting or self-regulating mechanism that allows the firing of multiple rounds through a single function of the trigger; and "single function of the trigger" means a single pull of the trigger and analogous motions. The term "machinegun" includes a bump-stock-type device, i.e., a device that allows a semi-automatic firearm to shoot more than one shot with a single pull of the trigger by harnessing the recoil energy of the semiautomatic firearm to which it is affixed so that the trigger resets and continues firing without additional physical manipulation of the trigger by the shooter."* (See 27 CFR § 479.11.)

Findings:

Note: FTISB previously examine a similar "forced reset trigger" from [redacted] *(holder of U.S. Patent 10514223) and determined it to be a combination of parts, designed and intended for use in converting a weapon into a machinegun; and therefore, a "**machinegun**" as defined in the GCA and NFA (see FTISB letter 307385, dated August 28, 2018 attached).*

Exhibit 1 is a Rare Breed Triggers, model FRT-15, AR15-type drop-in fire-control group, manufactured by Rare Breed Triggers in Orlando, Florida. I observed that the Exhibit has no serial number in accordance with 26 U.S.C. § 5842.

I examined Exhibit 1 and found it to be an AR15-type drop-in fire-control group with the following features and characteristics:

- ¼ inch wide hammer, trigger, and locking bar
- Aluminum housing
- Two (2) tubular pins
- One (1) solid pin
- Three (3) springs
- Two (2) pins with interior threads at both ends
- Four (4) hex head screws with exterior threads

During my examination, I observed the following markings on Exhibit 1:

Aluminum housing (right side): **RARE BREED**
-TRIGGERS-
US PAT. 10514223

Findings (Cont.):

Exhibit 1 is identifiable from U.S. Patent #10,514,223 B1 and functions on the same mechanical principle as U.S. Patent #10,254,067 B2.

U.S. Patent #10,514,223 B1 specifically states that this is a device which *"causes the trigger to be forcibly reset," and "once reset, movement of the trigger is blocked by a locking bar and cannot be pulled until the bolt has returned to battery, thus preventing "hammer follow" behind the bolt or bolt carrier."* My examination determined Exhibit 1 does not function by "hammer follow."

As explanation, FATD has also evaluated devices which prevented the trigger from positively resetting and resulted in a "hammer-follow" scenario. A device designed to prevent the hammer from positively resetting could cause a firearm to shoot automatically more than one shot, without manual reloading, by a single function of the trigger, and would also be classified as a combination of parts designed and intended, for use in converting a weapon into a machinegun; thus a "**machinegun**" as defined in 26 U.S.C. § 5845(b).

However, the incorporation of a positive disconnecting or trigger resetting feature alone, does not preclude or remove such a weapon or device from the definition of a "**machinegun**" as defined in the NFA, 26 U.S.C. § 5845(b). Although the presence of hammer follow may require classification of a firearm as a machinegun, this is just one way in which a firearm may satisfy the "machinegun" definition. Therefore, the mere absence of "hammer-follow" in an AR-type firearm does not exclude such a firearm from being classified as a machinegun. Machinegun classifications are based on the examination of the device and whether the device converts a weapon to shoot automatically.

Federal regulation, 27 CFR § 479.11, states that the term "automatically" as it modifies "shoots, is designed to shoot, or can be readily restored to shoot," means functioning as the result of a self-acting or self-regulating mechanism that allows the firing of multiple rounds through a single function of the trigger. Indeed, Federal courts have long held that automatically means that the weapon "fires repeatedly with a single pull of the trigger." *Staples v. United States*, 511 U.S. 600, 602 n. 1 (1994). "That is, once its trigger is depressed, the weapon will automatically continue to fire until its trigger is released or the ammunition is exhausted." Id.

Further, Federal regulation 27 CFR § 479.11, states that "single function of the trigger" means a single pull of the trigger and analogous motions. Courts have specifically affirmed ATF's interpretation that a single act of the shooter to initiate the firing sequence is a single function of the trigger. *Atkins v. United States*, 312 F. App'x 197, 200 (11th Cir. 2009); *Freedom Ordnance Mfg., Inc. v. Brandon*, 2018 U.S. Dist. LEXIS 243000 (S.D. Ind. Mar. 27, 2018) . *United States v. Fleischli*, 305 F.3d 643, 655 (7th Cir. 2002)(in which electronic switch was the trigger when it served to initiate the firing sequence and the minigun continued to fire until the switch was turned off or the ammunition was exhausted). In *Freedom Ordnance* case, the United States District Court of Indiana confirmed that ATF was not arbitrary and capricious in the classification of an "electronic reset assist device" as a machinegun even though the firearm's trigger reset before each shot by pushing the shooter's finger forward. *Freedom Ordnance Mfg., Inc,* No. 3:16-cv-00243-RLY-MPB. In these cases, a firearm is a machinegun when an internal mechanism or operation automatically forces the individual's finger forward instead of requiring that the shooter release the trigger.

Findings (Cont.):

If a device is designed to assist in preventing the hammer from positively resetting or which utilizes ***a spring, electric motor or non-manual source of energy which assists in the automatic resetting of the hammer and causes a firearm to shoot automatically more than one shot, without manual reloading, by a single function of the trigger***, such an item or device would be classified as a combination of parts designed and intended, for use in converting a weapon into a machinegun; thus a "machinegun" as defined in 26 U.S.C. § 5845(b).

Below is a description of how the Rare Breed Trigger, FRT-15 device operates with attached diagrams found on the Rare Breed Trigger website.

First, the FRT-15 device must be installed into an AR15-type weapon which includes a H3 weight buffer and M16-type bolt carrier. These components are necessary because the specific design of the FRT-15 requires these to function as designed.

The picture on page 4 of the attached, shows the position of the hammer (orange), trigger (red), and locking bar (green) in the FRT-15 device once the weapon is charged and the selector is placed in the fire position. In this configuration, the hammer is held in place with its sear surface against the front of the trigger.

When the trigger is pulled (rearward pressure applied to the trigger), the hammer is released and strikes the firing pin, igniting the cartridge primer, and starting the cycle of operations (See attachment page 5 picture 7).

As the bolt carrier moves to the rear, the hammer is driven into the top of the trigger forcing it forward. The bolt carrier then strikes the locking bar moving, it to lock the trigger in the forward position (See attachment page 6 picture 8).

As the bolt carrier moves forward, the trigger is held in the forward position by the locking bar and the hammer engages the sear surface on the front of the trigger (See attachment page 7 picture 9).

As the bolt carrier continues to move forward, it strikes the rear surface of the locking bar releasing the trigger. If the shooter maintains constant rearward pressure to the trigger, that single constant pull will continue the cycle of operation and fire a subsequent projectile. (See attachment page 8, 9 picture 10, 11). This differs from a cycle of oeprations in a typical AR-type semiautomatic firearm in which a shooter must release and pull the trigger to fire a second projecile. As stated, a firearm assembled with the FRT-15 requires no such release and subsequent pull by the shooter to fire a second projectile. Instead, the shooter may fire a second projectile merely by maintaining the initial trigger pull and allowing the self-acting internal mechanism to complete its automatic cycle of operation.

To confirm this, I assembled an AR15-type firearm from the National Firearms Collection (NFC) using a Bushmaster AR15-type receiver, H3 buffer, M16-type upper assembly, and the FRT-15 device (See attachment pages 10, 11 pictures 12, 13, 14, 15).

I test-fired Exhibit 1 on June 7, 2021, at the ATF test range, Martinsburg, West Virginia, using commercially available, Federal brand, 5.56x45mm caliber ammunition and a magazine from the NFC.

Findings (Cont.):

First, I inserted a one-round ammunition load, charged the weapon, and with the selector in the "FIRE" position, pulled the trigger. The NFC weapon, with Exhibit 1 installed, successfully expelled a single projectile by the action of an explosive. I repeated this method of test-fire one additional time, obtaining the same result.

Next, I inserted a two-round ammunition load, charged the weapon, and with the selector in the "FIRE" position pulled the trigger and held it to the rear, the NFC weapon, with Exhibit 1 installed, fired two (2) rounds automatically by a single pull/function of the trigger. I repeated this method of test-fire one additional time, obtaining the same result.

Finnaly, I inserted a five-round ammunition load, charged the weapon, and with the selector in the "FIRE" position, pulled the trigger and held it to the rear, the NFC weapon, with Exhibit 1 installed, fired five (5) rounds automatically by a single pull/function of the trigger. I repeated this method of test-fire one additional time, obtaining the same result.

The FRT-15 device incorporates parts that are novel to the operation of a typical AR-type semiautomatic firearm. These unique parts (hammer, trigger and locking bar) within the FRT-15 trigger mechanism are specifically designed to incorporate the standard rearward and forward movement of the AR-type bolt carrier in its cycle of operations allowing the weapon to function as a self-acting, or self-regulating, mechanism. Whereas in a typical AR-type firearm, the rearward movement of the bolt carrier extracts, then ejects a cartridge case, and cocks the hammer. However, in the FRT-15, the rearward movement is also utilized to eliminate the necessity for the shooter to release their pull of the trigger. In a typical AR-type firearm, the forward movement of the bolt carrier loads a subsequent cartridge, and locks the bolt, while the FRT-15 also utilizes this forward movement to automatically release the trigger and hammer, allowing the weapon to expel a second projectile without a separate pull of the trigger. In this way, one continuous pull of the trigger allows a semiautomatic firearm to shoot more than one shot. This mechanical action and principle is explained in U.S. Pat. #10,514,223 and U.S. Patent # 10,254,067 B2, and demonstrated in the test-fires above.

As received, Exhibit 1 is a combination of parts, designed and intended for use in converting a weapon (AR15-type) into a machinegun; therefore, it is a "**machinegun**" as defined in the GCA and NFA.

Conclusions:

Exhibit 1 is a combination of parts, designed and intended for use in converting a weapon into a machinegun; therefore, it is a "**machinegun**" as defined in 26 U.S.C. § 5845(b).

Exhibit 1 is a "**machinegun**" as defined in 18 U.S.C. § 921(a)(23).

Exhibit 1, being a machinegun, is also a "**firearm**" as defined in 26 U.S.C. § 5845(a)(6).

Exhibit 1 is not marked in accordance with 26 U.S.C. § 5842(a).

Examined By:

Digitally signed by David A. Smith1
Date: 2021.07.15 15:43:05 -04'00'

David A. Smith
Firearms Enforcement Officer

Approved By:

GREGORY STIMMEL
Digitally signed by GREGORY STIMMEL
Date: 2021.07.15 15:50:02 -04'00'

Gregory Stimmel, Chief
Firearms Technology Criminal Branch

Attachment: 11 pages bearing a total of 15 photographs, U.S. Patents #10,254,067 B2; 10,514,223 B1, and ATF letter # 307385.

Enclosed is a Firearms Technology Criminal Branch report provided in response to your request for assistance. Please be aware that these documents constitute "taxpayer return information" that is subject to the strict disclosure limitations provided in 26 U.S.C. § 6103. Exceptions to the non-disclosure provisions that permit the disclosure internally within ATF are set forth in 26 U.S.C. §§ 6103(h)(2)(C) and (o)(1). Any further disclosure of these reports is strictly limited and must be reviewed and approved by the Office of Chief Counsel prior to any information dissemination. Failure to adhere to the disclosure limitations provided in 26 U.S.C. § 6103 could result in civil and/or criminal liability.

317066 - Exhibit 1 – Picture 1, 2

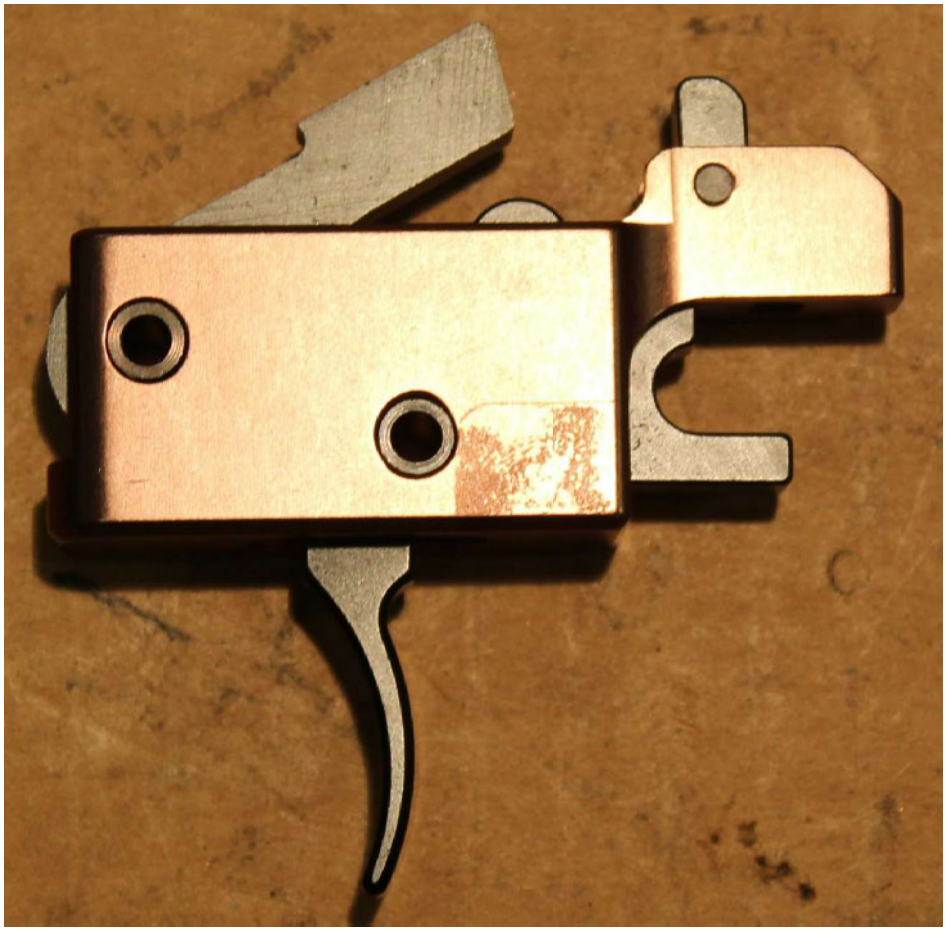
2021-595-DAS

1

ATF0113

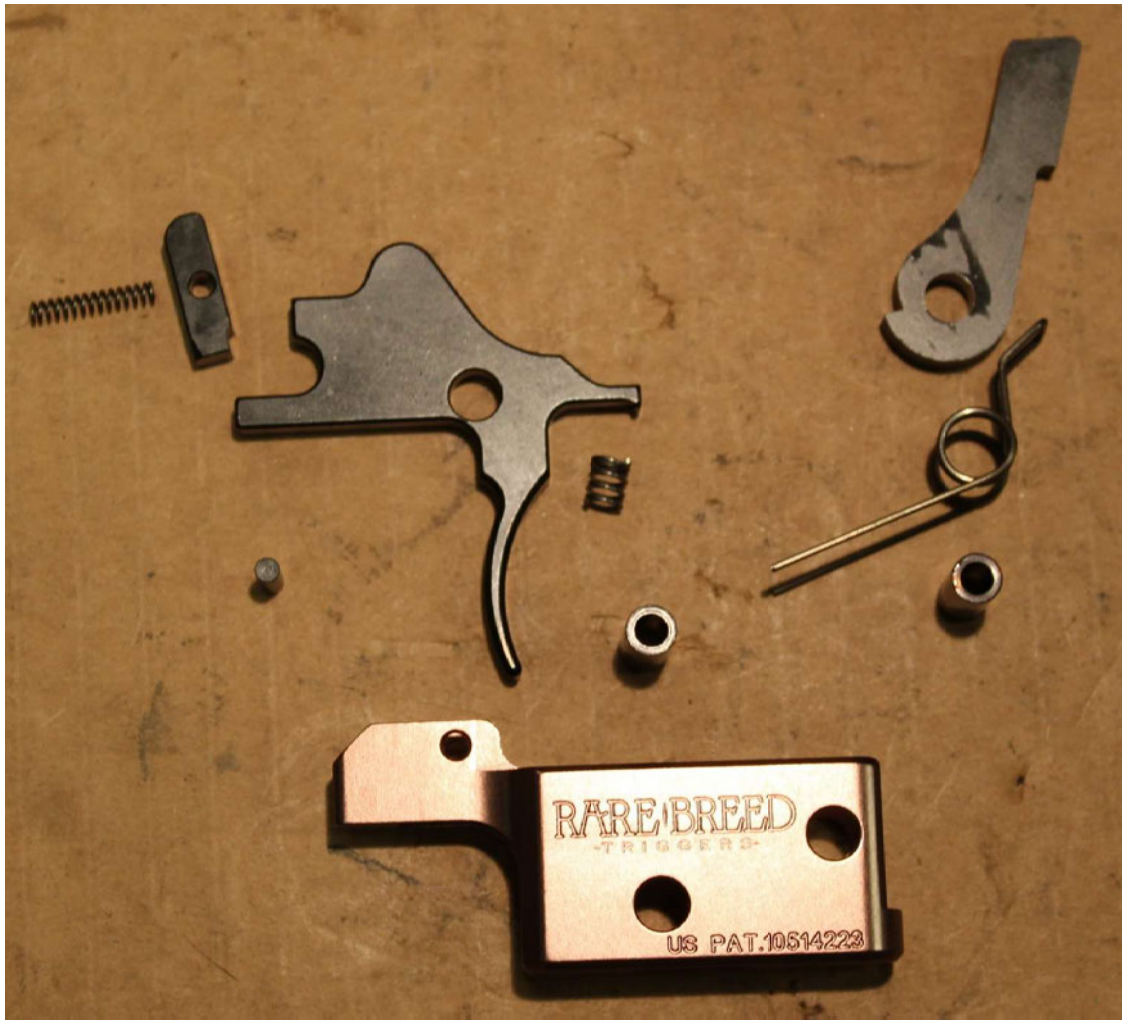
317066 - Exhibit 1 – Picture 3, 4

2021-595-DAS



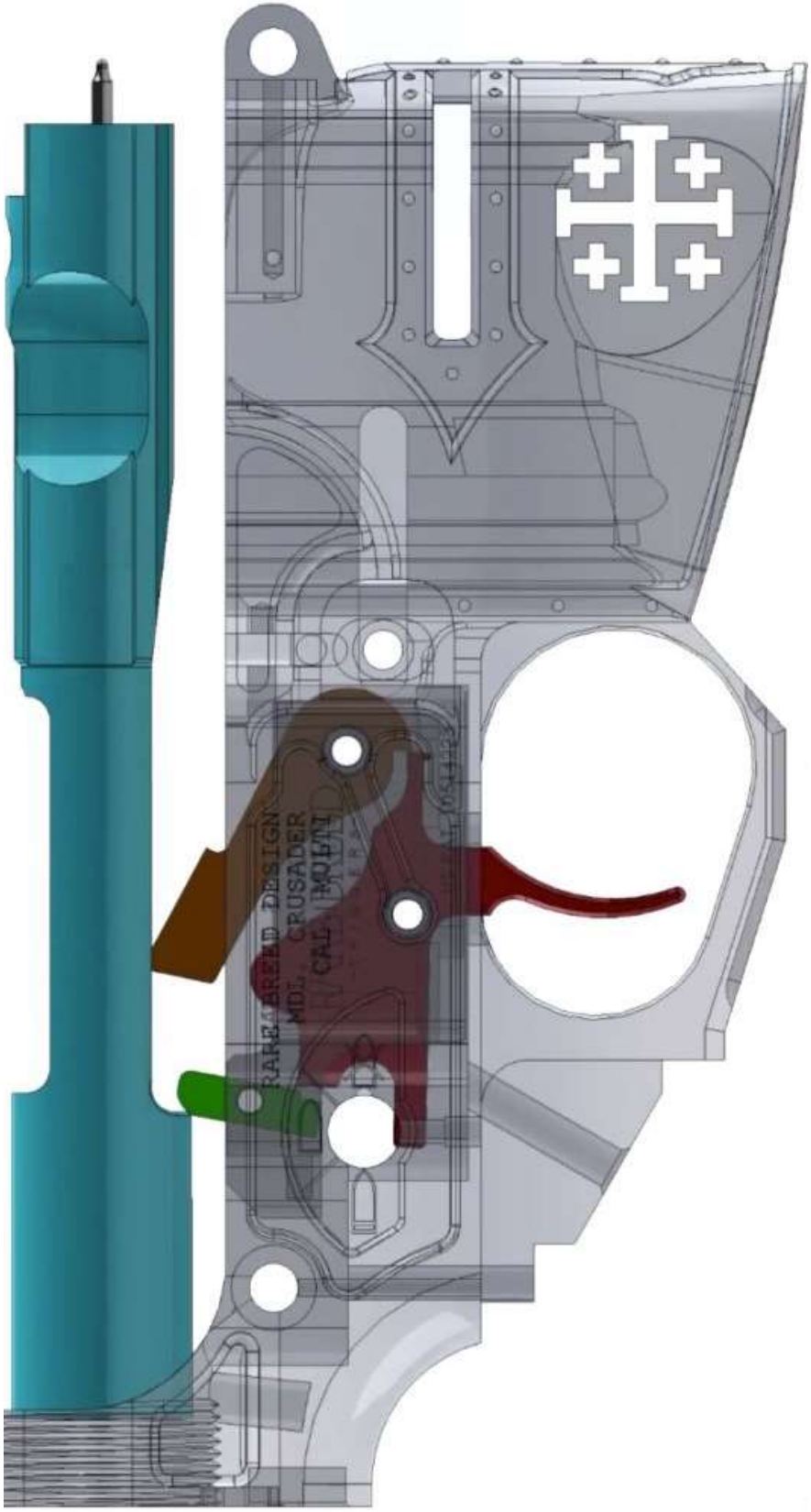
317066 - Exhibit 1 – Picture 5

2021-595-DAS



ATF0115

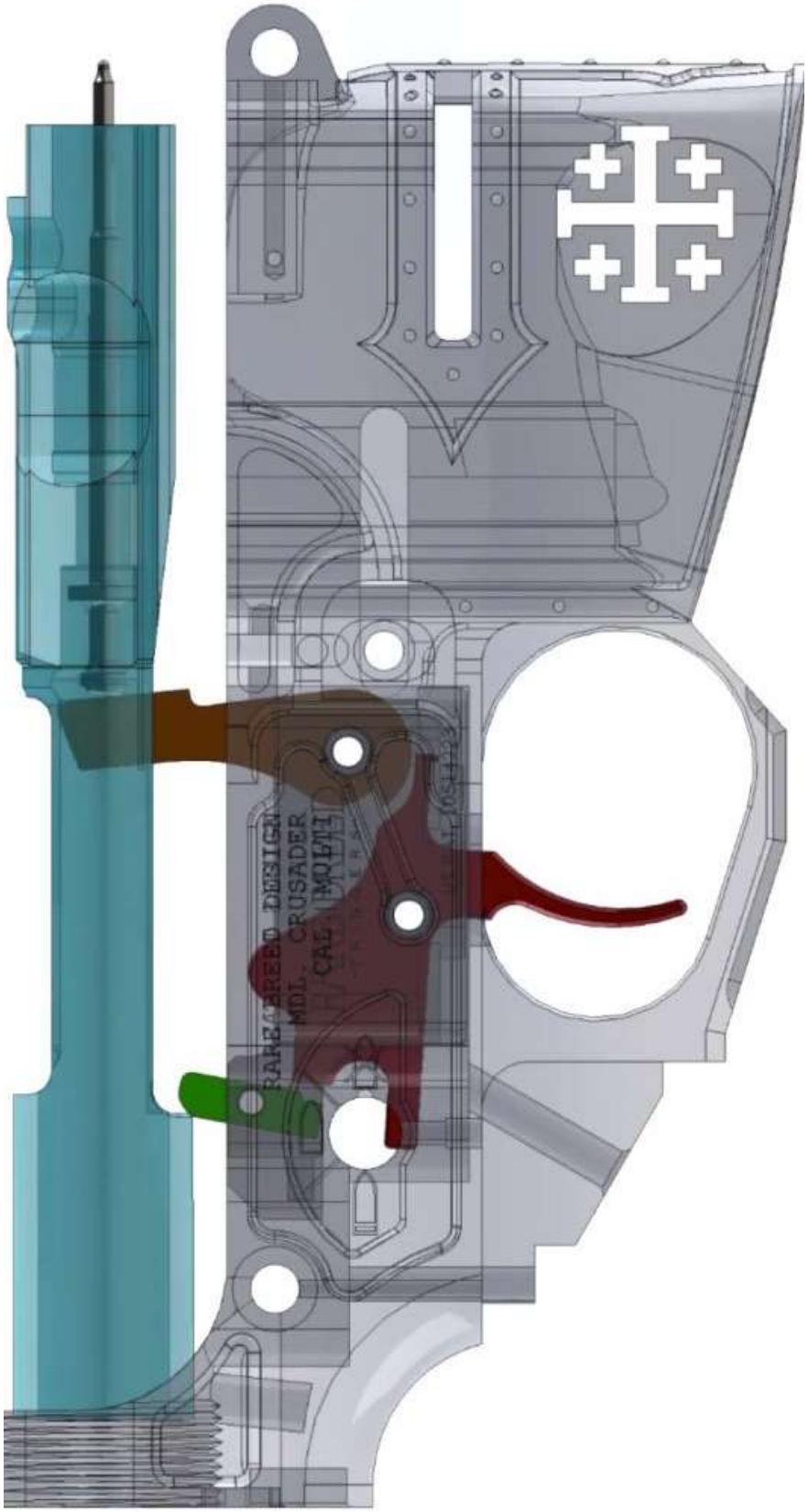
2021-595-DAS



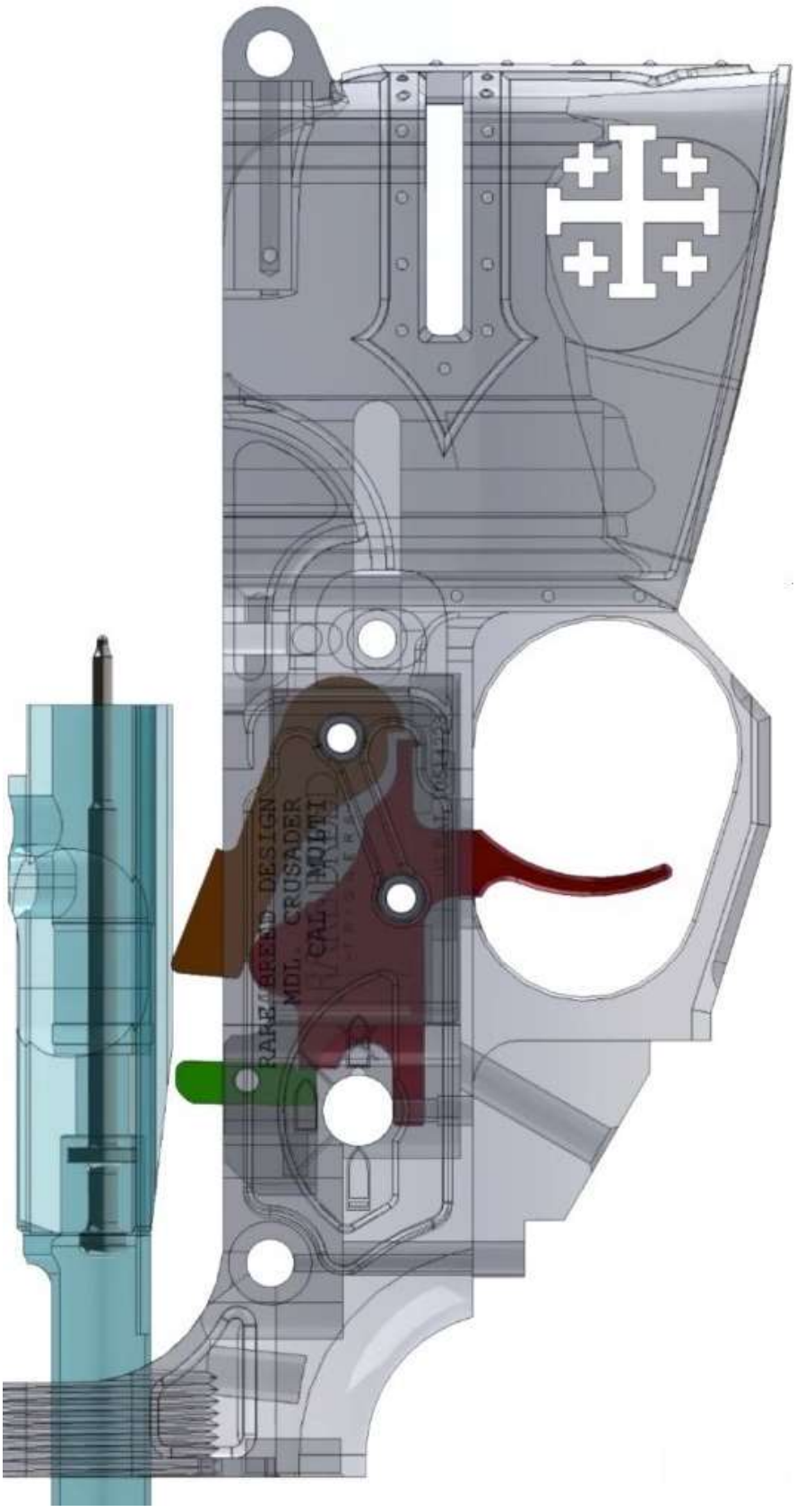
317066 - Exhibit 1 – Picture 6

317066 - Exhibit 1 – Picture 7

2021-595-DAS

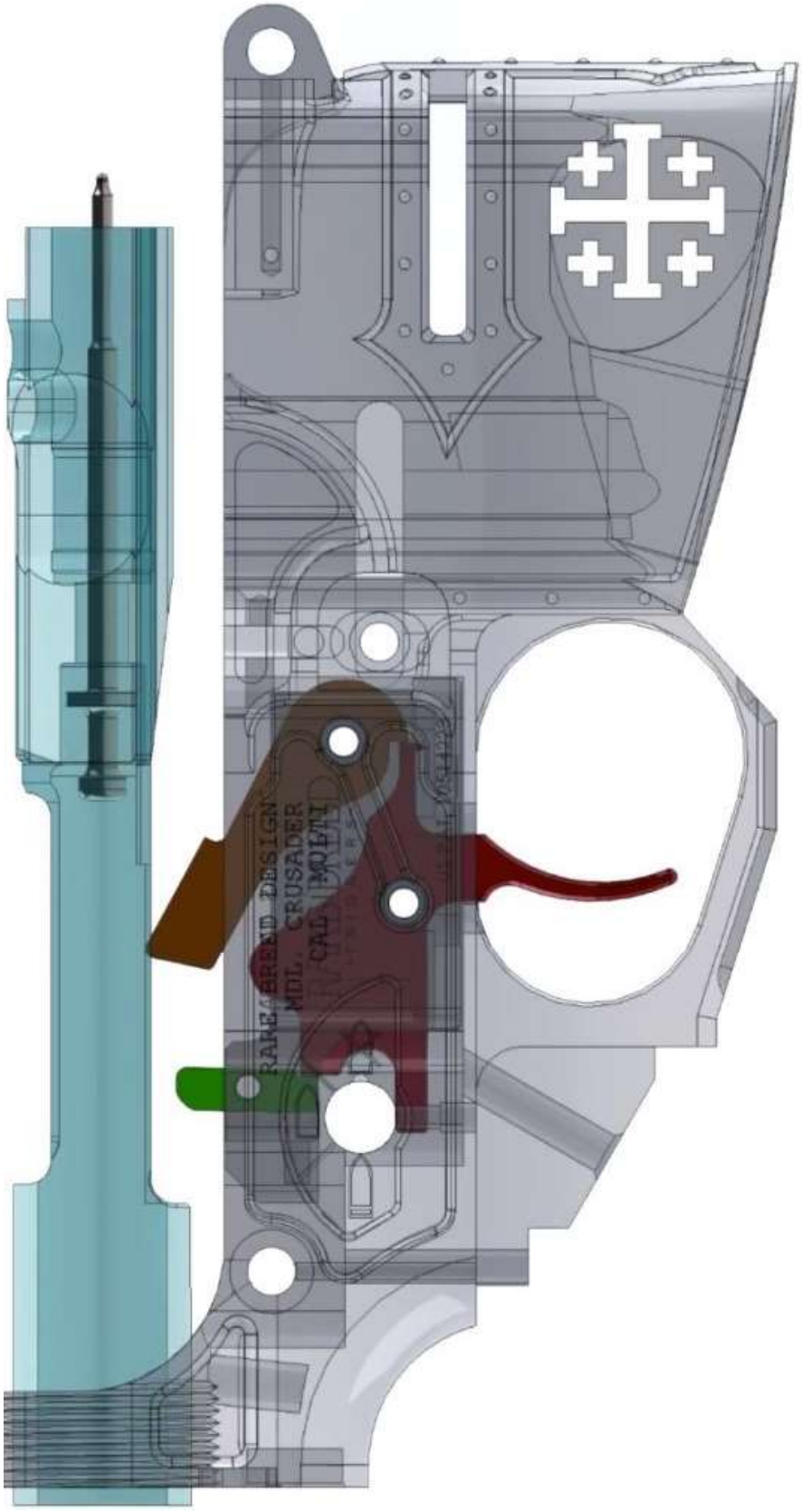


2021-595-DAS



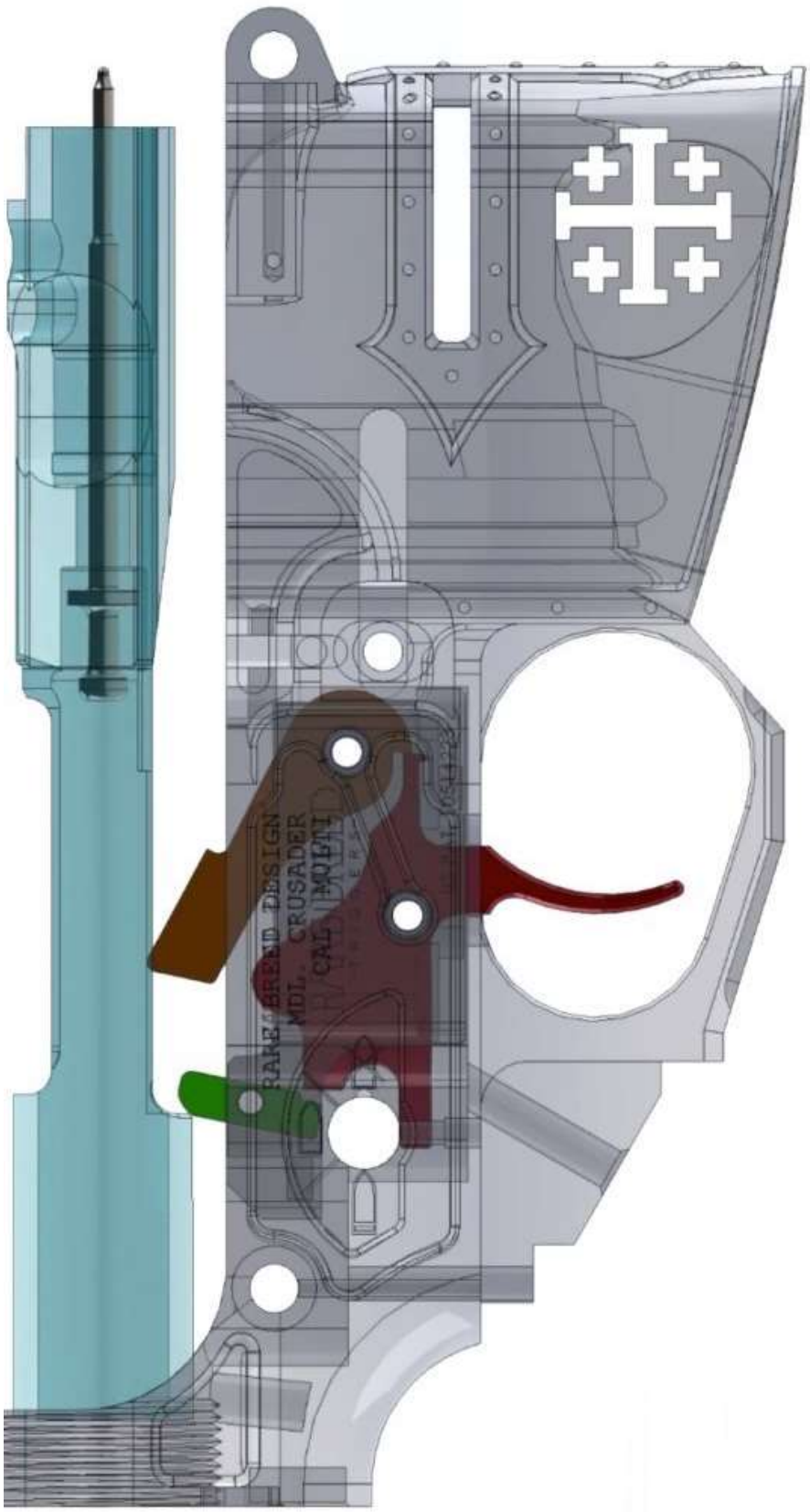
317066 - Exhibit 1 - Picture 8

2021-595-DAS



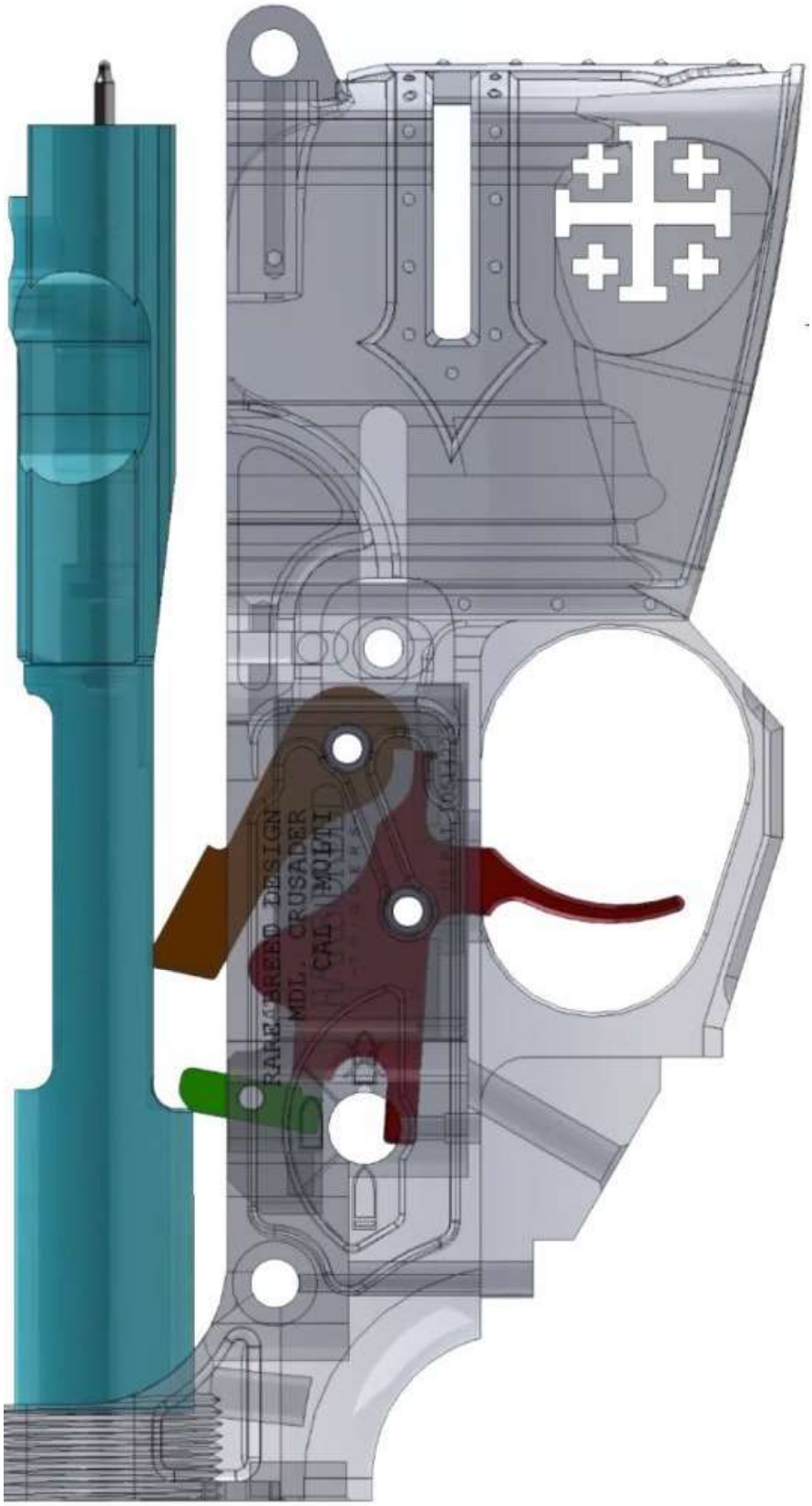
317066 - Exhibit 1 - Picture 9

2021-595-DAS



317066 - Exhibit 1 – Picture 10

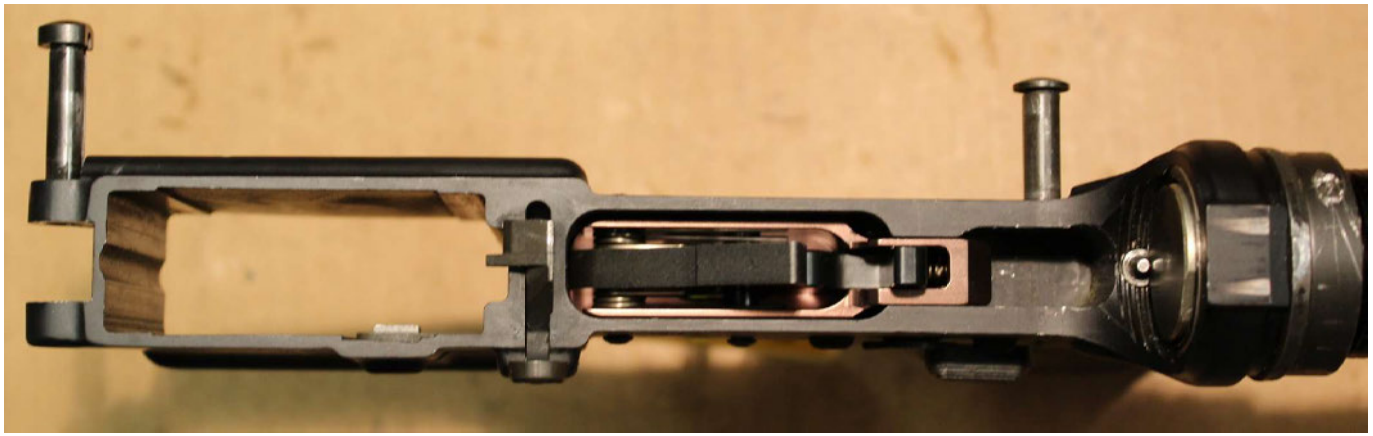
2021-595-DAS



317066 - Exhibit 1 - Picture 11

317066 - Exhibit 1 - Picture 12, 13

2021-595-DAS



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317066 - Exhibit 1 – Picture 14, 15

US010254067B2

(12) **United States Patent**
Foster

(10) **Patent No.: US 10,254,067 B2**
(45) **Date of Patent: Apr. 9, 2019**

(54) **TRIGGER-LOCKING APPARATUS, SYSTEM, AND METHOD FOR SEMIAUTOMATIC FIREARMS**

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(72) Inventor: **David Foster**, Seymour, IN (US)

(73) Assignee: **FOSTECH, INC.**, Seymour, IN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/419,460**

(22) Filed: **Jan. 30, 2017**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**

F41A 17/46	(2006.01)
F41A 19/06	(2006.01)
F41A 17/76	(2006.01)

(52) **U.S. Cl.**

CPC ***F41A 19/06*** (2013.01); ***F41A 17/76*** (2013.01)

(58) **Field of Classification Search**

CPC F41A 17/48; F41A 17/68; F41A 17/46; F41A 17/32; F41A 17/42; F41A 17/74; F41A 17/76; F41A 19/02; F41A 19/24; F41A 19/26; F41A 19/25; F41A 19/27; F41A 19/30; F41A 19/45

See application file for complete search history.

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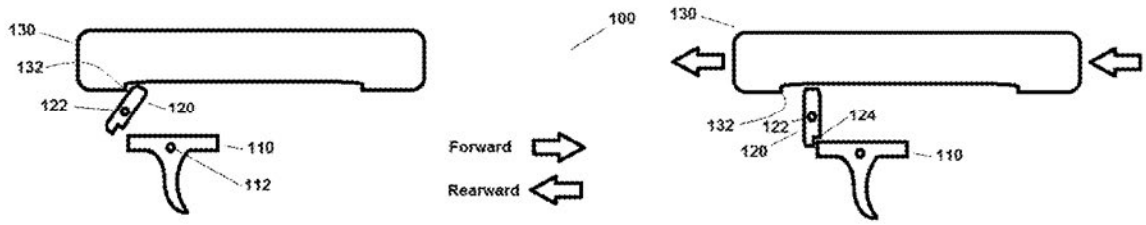
Primary Examiner — Derrick R Morgan

(74) *Attorney, Agent, or Firm* — Roberts IP Law; John Roberts

(57) **ABSTRACT**

Provided in various example embodiments is an apparatus, system, and method for improved control of selectable dual mode trigger systems for semiautomatic firearms, which may include a timed locking mechanism incorporated in the trigger system that ensures that the carrier is seated before the hammer is actuated, and that the anti-hammer-follow disconnect does not engage out of sequence. Such a mechanism ensures that the necessary steps occur in the proper sequence in the trigger mechanism, so that at any given time the trigger and firearm are ready for the next desired function to occur. The addition of a timed trigger lock mechanism to the trigger as disclosed herein ensures that the sequence of events in the trigger is maintained in the proper relationship, preventing misfires and jams. Such trigger locking mechanisms have applicability beyond dual-mode trigger systems, and may be applied in various forms to semiautomatic firearms generally.

18 Claims, 4 Drawing Sheets



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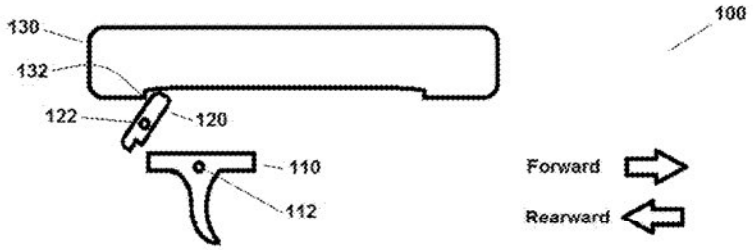

FIG. 1A

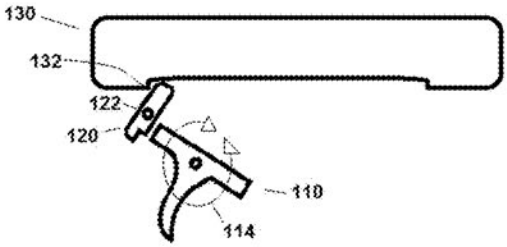

FIG. 1B

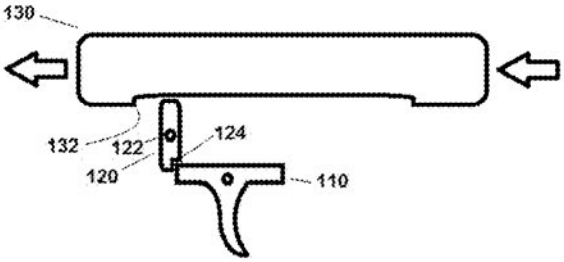

FIG. 1C

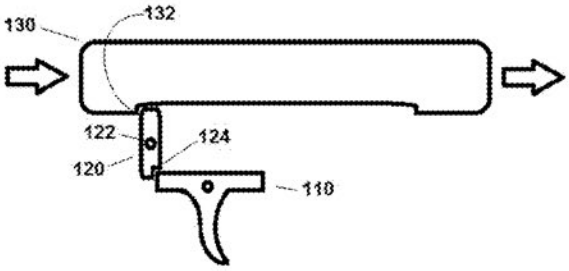

FIG. 1D

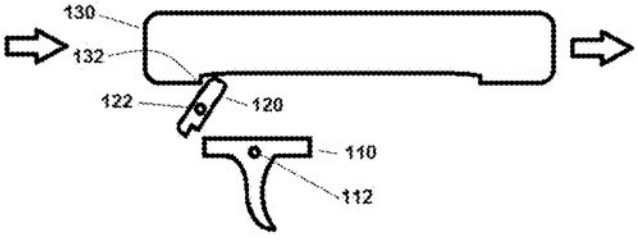

FIG. 1E

FIG. 2A

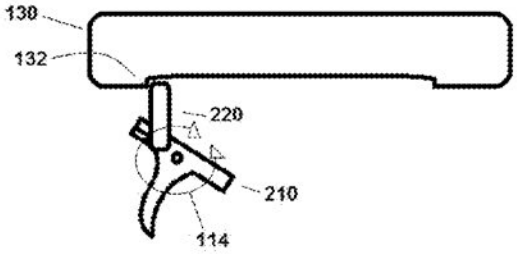

FIG. 2B

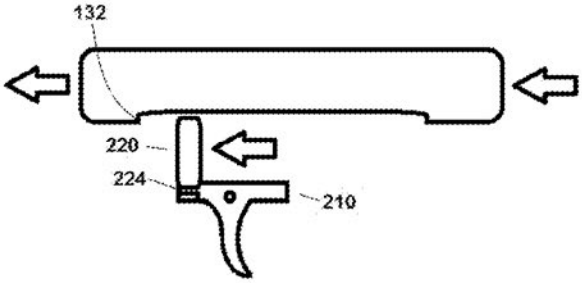

FIG. 2C

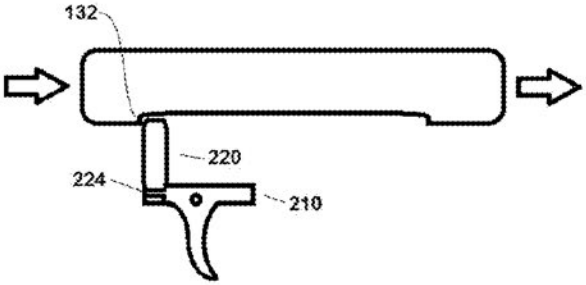

FIG. 2D

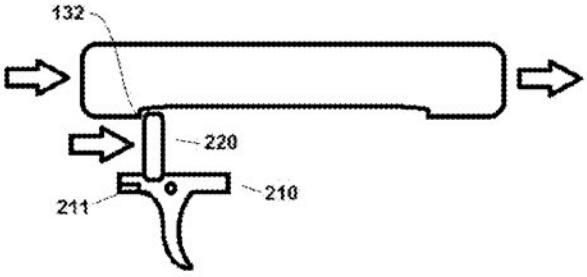

FIG. 2E

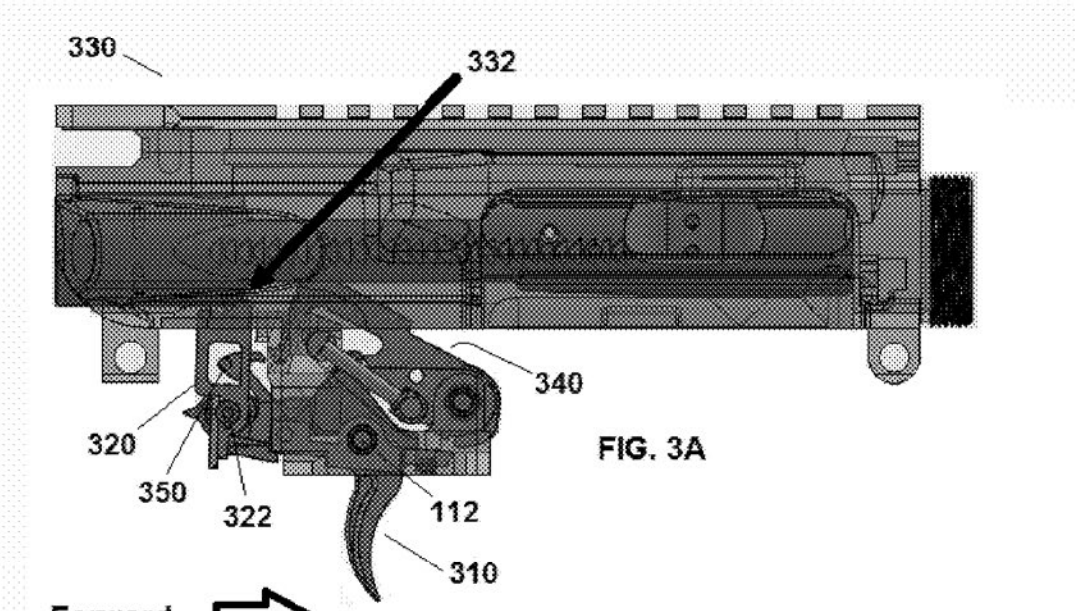
330
332
340
320
350
322
112
310

FIG. 3A

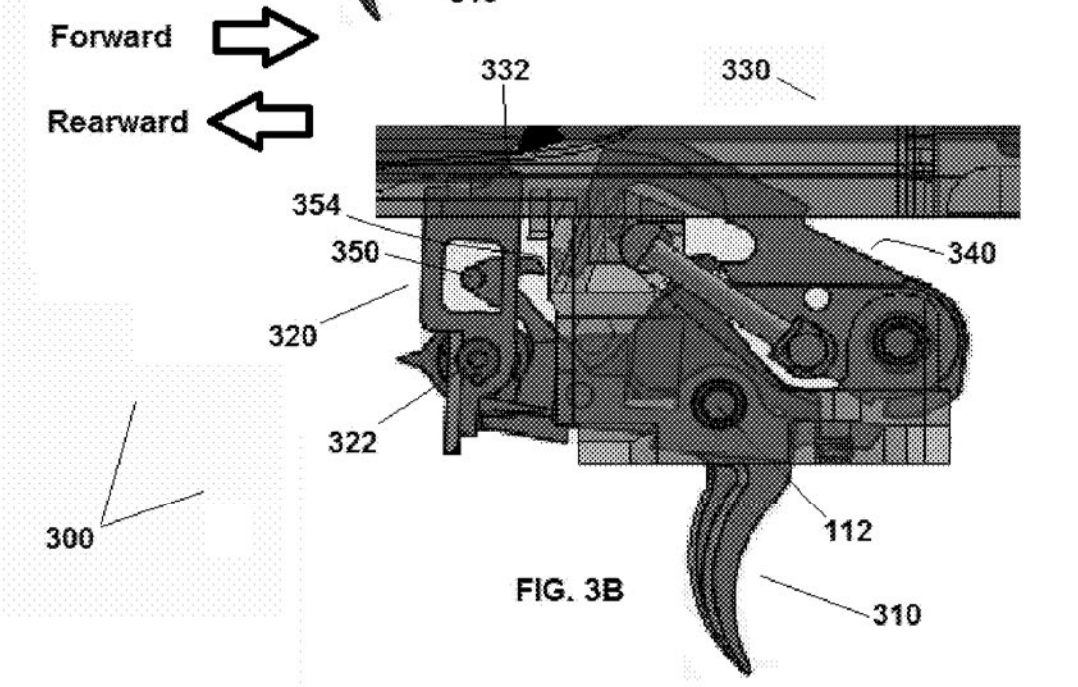
Forward
Rearward
332
330
354
350
340
320
322
300
112
310

FIG. 3B

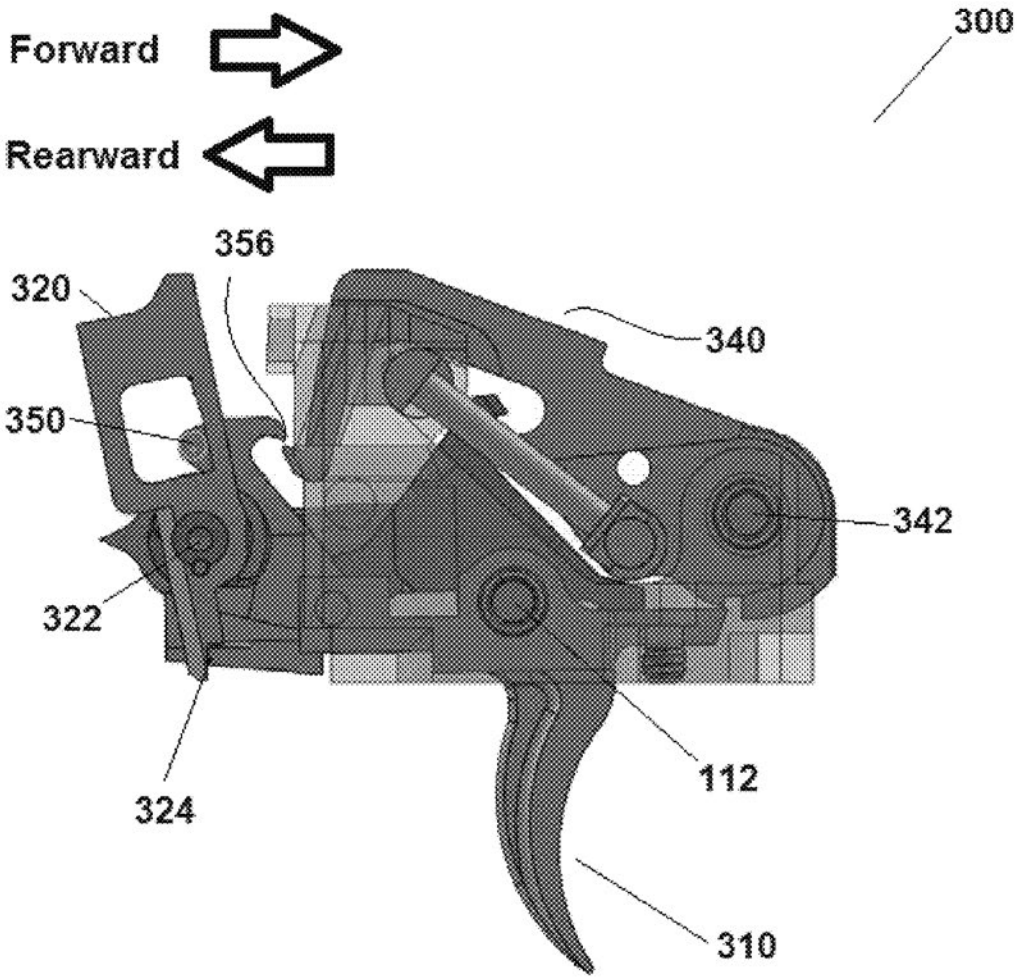

FIG. 4

TRIGGER-LOCKING APPARATUS, SYSTEM, AND METHOD FOR SEMIAUTOMATIC FIREARMS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to, incorporates herein by reference, and is a non-provisional of U.S. provisional patent application No. 62/288,385 to David Foster, filed Jan. 28, 2016 and entitled Timing Apparatus, System, and Method for Dual Mode Trigger for Semiautomatic Firearms (herein "the '385 Application"). This application also claims priority to, incorporates herein by reference, and is a non-provisional of U.S. provisional patent application No. 62/311,807 to David Foster, filed Mar. 22, 2016 and entitled Trigger Having a Moveable Sear and Firearms Incorporating Same (herein "the '807 Application").

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

None.

TECHNICAL FIELD

The present invention relates generally to firearms, and more particularly to improvements to trigger systems for semiautomatic firearms.

BACKGROUND

Selectable dual mode triggers for semiautomatic firearms are known, which include triggers capable of actuating and firing rounds on both pull and release of the trigger. Examples of such systems are disclosed in U.S. Pat. No. 8,667,881 B1 to Hawbaker, granted 2014-03-11 (herein "the '881 Patent"), and U.S. Pat. No. 8,820,211 B1 to Hawbaker, granted 2014-09-02 (herein "the '211 Patent") (collectively "the Hawbaker patents"), both of which are incorporated herein by reference. The characteristics of selecting modes of actuation in which only one round is discharged with one function of the trigger was approved by the ATF and granted the patents mentioned above and incorporated herein.

The introduction of a trigger that actuates on both pull and release presents several challenges. For example, during the testing of this new trigger, misfires were sometimes experienced due to light primer strikes, unexpected trigger states during actuation, and magazine changes. It quickly became apparent that improvements were needed to address these and related issues. In working to solve these problems, innovations were discovered that have applicability to not only pull-and-release triggers, but also to semiautomatic firearms generally.

SUMMARY

One of these innovations is a trigger-locking apparatus, system, and method for semiautomatic firearms, some examples of which are described herein. Illustrative examples of such trigger-locking apparatus were described in the '385 Application (as timing lever 7), and in the '807 Application (as timing lever 5), forming part of the pull-and-release triggers described therein. Such trigger-locking mechanisms can elegantly overcome certain problems of the prior art, such as hammer-follow leading to light primer strikes, and unexpected trigger states during actuation and magazine changes, while providing other advantages.

For example, provided in various example embodiments is a novel apparatus, system, and method for improved control of selectable dual mode trigger systems for semiautomatic firearms, which may include a timed locking mechanism incorporated in the trigger system that ensures that the carrier is seated before the hammer is actuated, and that the anti-hammer follow disconnect does not engage out of sequence. Such a mechanism ensures that the necessary steps occur in the proper sequence in the trigger mechanism, so that at any given time the trigger and firearm are ready for the next desired function to occur. The addition of a timing lever, or timed trigger lock mechanism, to the trigger as disclosed herein ensures that the sequence of events in the trigger is maintained in the proper relationship, preventing misfires and jams. Such trigger locking mechanisms have applicability beyond dual-mode trigger systems, however, and may be applied in various forms to semiautomatic firearms generally.

Accordingly, provided in various example embodiments is a trigger-locking apparatus for a semi-automatic firearm having a trigger and an action that cycles by loading, firing, and extracting cartridges when the firearm is repeatedly fired by movements of the trigger. In various example embodiments the trigger-locking apparatus may comprise a structure that when in a first position allows movement of the trigger between firing and non-firing positions, and when in a second position restricts movement of the trigger between firing and non-firing positions. The trigger-locking apparatus may be configured so that, when it is installed in the semi-automatic firearm, the structure is configured to automatically: be in the first position when the action of the firearm is in an in-battery position ready to fire a first cartridge; move to the second position when the firearm is firing the first cartridge and the action is being cycled; then return to the first position as the action of the firearm cycles back to the in-battery position ready to fire a second cartridge.

In various example embodiments the trigger-locking apparatus may be further configured so that, when it is installed in the semi-automatic firearm, the structure is configured to automatically move to the second position when the firearm is firing the second cartridge and the action is being cycled, then return to the first position as the action of the firearm cycles back to the in-battery position ready to fire a third cartridge. This sequence may be repeated for any suitable number of cartridges.

In various example embodiments the structure is biased toward the first position, for instance by a spring or any other suitable means. In various example embodiments the structure may be configured to move between the first and second positions by pivoting about an axis, while in other example embodiments the structure may be configured to move between the first and second positions by translating linearly.

In various example embodiments the action of the semi-automatic firearm may comprise a carrier assembly that is configured to translate longitudinally when the action is cycled, and the structure may be configured to be moved from the first position to the second position by longitudinal movement of the carrier assembly. In various example embodiments the carrier assembly may comprise a carrier, or a bolt, or any other suitable structure that engages and moves the structure from the first position to the second position when the carrier assembly translates longitudinally in a first direction when the action is cycled. Additionally or alternatively, in various example embodiments the structure

may be configured to be moved from the second position to the first position by or in cooperation with longitudinal movement of the carrier assembly. In various example embodiments the carrier assembly may comprise a carrier, or a bolt, or any other suitable structure that engages and moves or allows movement of the structure from the second position to the first position when the carrier assembly translates longitudinally in a second direction when the action is cycled.

In various example embodiments the action of the semi-automatic firearm may comprise a slide that is configured to translate longitudinally when the action is cycled, and the structure may be configured to be moved from the first position to the second position by longitudinal movement of the slide in a first direction. Additionally or alternatively, in various example embodiments the structure may be configured to be moved from the second position to the first position by or in cooperation with longitudinal movement of the slide. In various example embodiments the slide or a structure affixed therewith engages and moves or allows movement of the structure from the second position to the first position when the slide translates longitudinally in a second direction when the action is cycled.

In various example embodiments the trigger-locking apparatus may be configured for use with a semi-automatic firearm having a hammer that is releasably engaged by the trigger and by a secondary disconnector member, wherein the structure is further configured to release the secondary disconnector member from engagement with the trigger when the structure is moved from the first position to the second position. In various example embodiments such structure may be further configured to move the secondary disconnector member to an engagement position to engage with the trigger when the structure is moved from the second position to the first position. In various example embodiments the structure may be configured to move the secondary disconnector member from a position where it can engage the trigger to a position where it cannot engage the trigger when the structure is moved from the first position to the second position. In various example embodiments the structure may be configured to allow the secondary disconnector member to move from a position where it cannot engage the trigger to a position where it can engage the trigger when the structure is moved from the second position to the first position.

Also provided in various example embodiments are semi-automatic firearms incorporating any of the apparatus, features, or functions described herein.

Further provided in various example embodiments are methods of using the firearms, apparatus, features, or functions described herein. For example, provided in various example embodiments is a method of operating the semi-automatic firearms described herein, comprising the steps of moving the trigger and firing the first cartridge, causing the action to cycle and the structure to move from the first position into the second position thereby causing the trigger-locking apparatus to lock the trigger, and as the action of the firearm cycles back to the in-battery position ready to fire the second cartridge, causing the structure to move from the second position back to the first position thereby causing the trigger-locking apparatus to unlock the trigger.

In various example embodiments where the semi-automatic firearm further comprise a hammer that is releasably engaged by the trigger and by a secondary disconnector member, and wherein the structure is further configured to release the secondary disconnector member from engagement with the trigger when the structure is moved from the first position to the second position, and to move the secondary disconnector member to an engagement position to engage with the trigger when the structure is moved from the second position to the first position, the method may further comprise the steps of: causing the structure to release the secondary disconnector member from engagement with the trigger by causing the structure to move from the first position to the second position; and causing the structure to move the secondary disconnector member to an engagement position to engage with the trigger by causing, allowing, or cooperating with the structure to move the structure from the second position to the first position.

The foregoing summary is illustrative only and is not meant to be exhaustive or limiting. Other aspects, objects, and advantages of various example embodiments will be apparent to those of skill in the art upon reviewing the accompanying drawings, disclosure, and appended claims. These together with other objects of the invention, along with various features of novelty, which characterize the invention, are pointed out with particularity in the claims annexed hereto and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings, claims and descriptive matter in which there is illustrated a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A-**1**E illustrate a first example embodiment of a trigger-locking apparatus, system, and method for semiautomatic firearms that have an action that cycles by loading, firing, and extracting cartridges when the firearm is repeatedly fired by movements of the trigger, comprising a first example structure that when in an unlocked position shown in FIGS. **1**A, **1**B, **1**E, allows movement of the trigger between non-firing and firing positions as shown in FIGS. **1**A and **1**B, and when in a locked position shown in FIGS. **1**C and **1**D, restricts movement of the trigger between firing and non-firing positions.

FIG. **1**A shows the first example embodiment with a first example locking structure rotated to an unlocked position by a carrier assembly that is translated longitudinally forward when the action of the firearm is in an in-battery position ready to fire a cartridge.

FIG. **1**B depicts the example embodiment of FIG. **1**A with the trigger moving between non-firing and firing positions.

FIG. **1**C shows the example embodiment of FIG. **1**B with the trigger released and the locking structure rotated to a locked position after it has been released from the unlocked position by movement of the carrier assembly longitudinally rearward in the direction of the arrows, as when the action of the firearm is being cycled during the firing of a cartridge.

FIG. **1**D shows the example embodiment of FIG. **1**C with the carrier assembly returning longitudinally forward in the direction of the arrows and re-contacting the locking structure as the action of the firearm continues to cycle after the firing of a cartridge.

FIG. **1**E shows the embodiment of FIG. **1**D with the carrier assembly having fully returned longitudinally forward in the direction of the arrows and re-rotating the locking structure to the unlocked position of FIG. **1**A when the action of the firearm is in an in-battery position ready to fire a second cartridge.

FIGS. **2**A-**2**E illustrate a second example embodiment of a trigger-locking apparatus, system, and method for semi-automatic firearms that have an action that cycles by load-

ing, firing, and extracting cartridges when the firearm is repeatedly fired by movements of the trigger, comprising a second example structure that when in an unlocked position shown in FIGS. **2**A, **2**B, **2**E, allows movement of the trigger between non-firing and firing positions as shown in FIGS. **2**A and **2**B, and when in a locked position shown in FIGS. **2**C and **2**D, restricts movement of the trigger between firing and non-firing positions.

FIG. **2**A shows the second example embodiment with a second example locking structure translated to an unlocked position by a carrier assembly that is translated longitudinally forward when the action of the firearm is in an in-battery position ready to fire a cartridge.

FIG. **2**B depicts the example embodiment of FIG. **2**A with the trigger moving between non-firing and firing positions.

FIG. **2**C shows the example embodiment of FIG. **2**B with the trigger released and the locking structure translated to a locked position after it has been released from the unlocked position by movement of the carrier assembly longitudinally rearward in the direction of the arrows, as when the action of the firearm is being cycled during the firing of a cartridge.

FIG. **2**D shows the example embodiment of FIG. **2**C with the carrier assembly returning longitudinally forward in the direction of the arrows and re-contacting the locking structure as the action of the firearm continues to cycle after the firing of a cartridge.

FIG. **2**E shows the embodiment of FIG. **2**D with the carrier assembly having fully returned longitudinally forward in the direction of the arrows and re-translating the locking structure to the unlocked position of FIG. **2**A when the action of the firearm is in an in-battery position ready to fire a second cartridge.

FIGS. **3**A, **3**B, and **4** illustrate a third example embodiment of a trigger-locking apparatus, system, and method for semiautomatic firearms that have an action that cycles by loading, firing, and extracting cartridges when the firearm is repeatedly fired by movements of the trigger, comprising a third example structure that when in an unlocked position shown in FIGS. **3**A, **3**B, allows movement of the trigger between non-firing and firing positions, and when in a locked position shown in FIG. **4**, restricts movement of the trigger between firing and non-firing positions. The third example embodiment includes a hammer that is releasably engaged by the trigger and by a secondary disconnector member.

FIG. **3**A shows the third example embodiment with the third example locking structure rotated to an unlocked position by a carrier assembly that is translated longitudinally forward when the action of the firearm is in an in-battery position ready to fire a cartridge. In this unlocked position, the third example locking structure has allowed the secondary disconnector member to move to an engagement position to engage with the trigger.

FIG. **3**B is a closer view of a portion of FIG. **3**A.

FIG. **4** shows the third example embodiment with the third example locking structure rotated to locked position as when the carrier assembly of FIG. **3**A (not shown in FIG. **4**) is translated longitudinally rearward as when the action of the firearm is being cycled during the firing of a cartridge. In this locked position, the third example locking structure has moved the secondary disconnector member to a position where it will not engage with the trigger.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

Reference will now be made in detail to some specific example embodiments, including any best mode contemplated by the inventor. Examples of these specific embodiments are illustrated in the accompanying drawings. While the invention is described in conjunction with these specific embodiments, it will be understood that it is not intended to limit the invention to the described or illustrated embodiments. On the contrary, it is intended to cover alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. Particular example embodiments may be implemented without some or all of these features or specific details. In other instances, components and procedures well known to persons of skill in the art have not been described in detail in order not to obscure inventive aspects.

Various techniques and mechanisms will sometimes be described in singular form for clarity. However, it should be noted that some embodiments may include multiple iterations of a technique or multiple components, mechanisms, and the like, unless noted otherwise. Similarly, various steps of the methods shown and described herein are not necessarily performed in the order indicated, or performed at all in certain embodiments. Accordingly, some implementations of the methods discussed herein may include more or fewer steps than those shown or described.

Further, the example techniques and mechanisms described herein will sometimes describe a connection, relationship or communication between two or more items or entities. It should be noted that a connection or relationship between entities does not necessarily mean a direct, unimpeded connection, as a variety of other entities or processes may reside or occur between any two entities. Consequently, an indicated connection does not necessarily mean a direct, unimpeded connection unless otherwise noted.

To ensure clarity, an explanation of the term "in-battery" will now be provided. "In-battery" refers to the status of a firearm once the action has returned to the normal firing position. Out-of-battery refers to the status of a firearm before the action has returned to the normal firing position. According to the website Wikipedia, the term originates from artillery, referring to a gun that fires before it has been pulled back. In artillery guns, "out of battery" usually refers to a situation where the recoiling mass (breech and barrel) has not returned to its proper position after firing because of a failure in the recoil mechanism. Gun carriages should normally be designed to prevent this in typical circumstances. But if a gun is fired out of battery, then damage to the carriage can occur, as the effectiveness of the recoil mechanism will have been compromised. In firearms and artillery where there is an automatic loading mechanism, a condition can occur in which a live round is at least partially in the firing chamber and capable of being fired, but is not properly secured by the usual mechanism of that particular weapon (and thus is not "in battery"). The gas pressure produced at the moment of firing can rupture the not-fully-supported cartridge case and can result in flame and high-pressure gas being vented at the breech of the weapon, potentially creating flying shrapnel and possibly injuring the operator. Depending on the design, it is also possible for a semi-automatic firearm to simply not fire upon pulling the trigger when in an out-of-battery state. The present locking mechanisms **100**, **200**, **300** and the like are designed to prevent pulling the trigger **110** when the firearm is in an out-of-battery state, which can sometimes happen in most if

not all semi-automatic firearms, but is a special risk in those firearms capable of firing upon both the pull and the release of the trigger **110**.

Referring now to the drawings in detail to the drawings wherein like elements are indicated by like numerals, there are shown various aspects of example trigger-locking apparatus, system, and method for semiautomatic firearms. FIGS. **1**A-**1**E illustrate a first example embodiment of certain portions of a trigger-locking apparatus, system, and method **100** for semiautomatic firearms. While not reproduced in the present figures for the sake of visual clarity, it is well known that semiautomatic firearms typically have a mechanism commonly known as an action that cycles by loading, firing, and extracting cartridges when the firearm is repeatedly fired by movements of the trigger. Here, the system **100** may comprise a trigger **110**, which may pivot about an axis **112** between firing and non-firing positions (indicated by arrow **114**), or may alternatively move laterally or may be actuated in any other suitable manner (not shown).

The system **100** may comprise a structure **120** that when in an unlocked position shown in FIGS. **1**A, **1**B, **1**E, allows movement **114** of the trigger **110** between non-firing and firing positions as shown in FIGS. **1**A and **1**B. Turning to FIG. **1**A, shown is a first example embodiment **100** with a first example locking structure **120** rotated about an axis **122** to an unlocked position by a carrier assembly **130** that is translated longitudinally forward (as indicated by the Forward arrow on the figures) when the action of the firearm is in an in-battery position ready to fire a cartridge (not shown). More specifically, in the example embodiment **100**, an engagement feature **132** may be provided on or as part of carrier assembly **130** that when longitudinally translated forward and adjacent the structure **120**, mechanically engages an upper portion of the structure **120** (that portion above the axis **122**) and pushes it forward, thus causing the structure **120** to pivotally rotate about axis **122** in a clockwise direction as shown in FIGS. **1**A and **1**B, until the trigger **110** can rotate about its axis **112** sufficiently to fire a cartridge without the structure **120** interfering with the movement **114** of the trigger **110**. This is the unlocked position.

The carrier assembly **130** may comprise any suitable components and features, such as a carrier, bolt assembly, bolt, and the like, as is known in the art of semi-automatic rifles, for instance. Alternatively, carrier assembly **130** may comprise a slide, for instance as is known in the art of semi-automatic pistols. Engagement feature **132** may comprise or be formed onto, into, or as part of any portion of the carrier assembly **130**, and may comprise an abutment, a groove, or a convex or concave surface, or any other mechanical structure that will suitably function to mechanically engage the locking structure **120**.

A spring or other biasing means (not shown) may be provided to rotationally urge the structure **120** in a counter-clockwise direction about the axis **122**. For example and not by way of limitation, a torsional spring may be affixed against the structure **120** and around axis **122**, or a helical compression spring may be provided pushing the upper portion of the structure **120** (that portion above the axis **122**) in the rearward direction, or a helical compression spring may be provided pushing the lower portion of the structure **120** (that portion below the axis **122**) in the forward direction, for example.

Once the trigger **110** is actuated by movement **114** between firing and non-firing positions and a cartridge is fired, the action of the firearm begins to cycle causing the carrier assembly **130** to move rearward as depicted in FIG. **1**C. This moves the engagement feature **132** away from the locking structure **120**, allowing the spring or other urging means discussed above but not shown to cause the locking structure **120** to automatically rotate counter-clockwise around axis **122**, such that when the trigger **110** is moved **114** between firing and non-firing positions, for instance when it is released, the locking structure **120** automatically engages the trigger **110** at a locking interface **124** and locks the trigger **110** in position as shown in FIGS. **1**C and **1**D, thereby restricting movement **114** of the trigger **110** between firing and non-firing positions while the action of the firearm is out-of-battery.

FIG. **1**D shows the example embodiment **100** discussed above with respect to FIG. **1**C with the carrier assembly **130** returning longitudinally forward in the direction of the arrows and the engagement feature **132** of the carrier assembly **130** re-contacting the locking structure **120** as the action of the firearm continues to cycle after the firing of a cartridge.

FIG. **1**E shows the example embodiment **100** discussed above with respect to FIG. **1**D with the carrier assembly **130** having fully returned longitudinally forward in the direction of the arrows when the action of the firearm is in an in-battery position ready to fire a second cartridge. The engagement feature **132** of the carrier assembly **130** has pushed forward the upper portion of the locking structure **120**, causing the locking structure **120** to rotate clockwise against whatever spring forces may be urging the locking structure in the counter-clockwise direction, and the firearm and its components are in the same positions and states as they were at the beginning of the process as shown and described with respect to FIG. **1**A, namely with the trigger **110** automatically unlocked and free to move **114** as shown in FIG. **1**B once the action of the firearm returns to in-battery position. This sequence can be repeated any number of times with any number of cartridges.

FIGS. **2**A-**2**E illustrate a second example embodiment of a trigger-locking apparatus, system, and method **200** for semiautomatic firearms that have an action that cycles by loading, firing, and extracting cartridges when the firearm is repeatedly fired by movements of the trigger. System **200** may comprise a trigger **210**, which may pivot about an axis **112** between firing and non-firing positions (indicated by arrow **114**), or may alternatively move laterally or may be actuated in any other suitable manner (not shown).

The system **200** may comprise a structure **220** that when in an unlocked position shown in FIGS. **2**A, **2**B, **2**E, allows movement **114** of the trigger **210** between non-firing and firing positions as shown in FIGS. **2**A and **2**B. Turning to FIG. **2**A, shown is a second example embodiment **200** with a second example locking structure **220** that translates linearly in a forward direction (as indicated by the Forward arrow on the figures), to an unlocked position by a carrier assembly **130** that is also translated longitudinally forward when the action of the firearm is in an in-battery position ready to fire a cartridge (not shown). More specifically, in the example embodiment **200**, an engagement feature **132** may be provided on or as part of carrier assembly **130** that when longitudinally translated forward and adjacent the structure **220**, mechanically engages an upper portion **221** of the structure **220** and pushes the whole structure **220** to a forward position as shown in FIGS. **2**A and **2**B (for instance in a channel or other guiding structure, not shown), until the trigger **210** can rotate about its axis **112** sufficiently to fire a cartridge without the structure **220** interfering with the movement **114** of the trigger **210**. This is the unlocked position.